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1957

CATALOG

1958

GRADUATE SCHOOL

U. S. DEPARTMENT OF AGRICULTURE

WASHINGTON, D. C.

GRADUATE
UNDERGRADUATE
AND
NON-ACADEMIC
COURSES
TRAINING FOR
FEDERAL EMPLOYEES

Calendar for 1957-58

FALL SEMESTER

Sept. 14-21	Registration (Late fee charged after Sept. 21)
Sept. 23-27	Classes begin
Oct. 4	Last day of registration for credit
	Last day of course transfer without late fee
Oct. 18	Deferred payments due
Nov. 1	Deadline for credit-audit change
Nov. 11	Veterans Day—no classes
Nov. 28	Thanksgiving Day—no classes
Dec. 23-Jan. 3	Christmas holidays—no classes
Jan. 6	Classes resume
Jan. 24	Close of fall semester *

SPRING SEMESTER

Feb. 1-8	Registration (Late fee charged after Feb. 8)
Feb. 10-14	Classes begin
Feb. 21	Last day of registration for credit
	Last day of course transfer without late fee
Mar. 7	Deferred payments due
Mar. 21	Deadline for credit-audit change
May 30	Close of spring semester *
May 30	Memorial Day—no classes

SUMMER SESSION

June 2-7	Registration (Late fee charged after June 7)
June 9-13	Classes begin
June 13	Last day of registration for credit
	Last day of course transfer without late fee
June 20	Deferred payments due
July 4	Independence Day—no classes
July 11	Deadline for credit-audit change
August 15	Close of summer session *

* Class meetings that are missed for any reason will be made up.

GRADUATE SCHOOL
UNITED STATES DEPARTMENT OF AGRICULTURE
CATALOG

FALL — SPRING — SUMMER
1957 — 1958



*Please keep this catalog for use in
the Spring and Summer*

This Catalog, published annually by the Graduate School, covers graduate and undergraduate programs for the Fall and Spring Semesters and the Summer Session. It is made as accurate as possible, but the right is reserved to make changes in details as circumstances require. A bulletin on correspondence study is available on request.

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General Information

PURPOSE OF THE SCHOOL

Since its establishment in 1921, the objective of the Department of Agriculture Graduate School has been to improve the Federal Service by providing needed educational opportunities for Federal employees. The Graduate School now offers a resident evening program in Washington and a small correspondence program. In addition, it presents lecture series, offers educational counseling, contributes to training programs in the Department of Agriculture, and participates in cooperative programs with land-grant and other educational institutions. Graduate study is the primary interest of the School, but it also offers an undergraduate program. Graduate School classes are open to all qualified employees of the Federal Government and to other qualified persons as facilities permit.

FOUNDING OF THE SCHOOL

The statute that established the Department of Agriculture in 1862 gave it the responsibility to "disseminate agricultural information in the broadest sense of the word." Thus from the beginning employees of the Department have been educators, and it soon became apparent that if they were to be successful, they needed opportunities to continue their training while employed.

In 1898, Secretary of Agriculture Wilson expressed the need of the Department for an organization such as the Graduate School, particularly to provide post-entry education for young scientists coming into the Department's research programs. No action, however, was taken at that time. Shortly after World War I, when the need for qualified personnel became acute throughout the government, the Congressional Joint Committee on the Reclassification of Salaries recommended that the government departments give more attention to the development of opportunities within the Federal Service for the continuing education of their employees. Accordingly, the Secretary of Agriculture appointed in 1920 a special committee to explore the matter. After considering the committee's findings and consulting leading educational institutions and other government agencies, the Secretary established the Graduate School in 1921 and announced at that time: "I believe those who may be able to avail themselves of this opportunity will both enrich themselves and enhance the value of the service they render."

ACCREDITED STANDING

The Graduate School does not grant degrees and has never sought that authority. It prefers to give courses of standard graduate and undergraduate grade; to have the merits of these courses judged by the well-known competence of its instructors; and to cooperate with institutions that have the authority to grant degrees. Students should consult *in advance* with these institutions if they wish to receive credit for courses taken in the Graduate School.

The United States Civil Service Commission accepts Graduate School credits, for examination and qualification purposes, on the same basis as those from accredited colleges and universities.

ADMINISTRATION

The government of the Graduate School is vested in a General Administration Board appointed by the Secretary of Agriculture. The functions of this Board correspond in general to those of boards of trustees of universities. The School is administered by a director and a small administrative staff. It is a nonprofit institution and receives no Federal funds.

The evening program in Washington is organized into eight departments. Each department is directed by a departmental committee composed of an appointed chairman and others of recognized competence in the respective fields. These committees are responsible for organizing and giving general administrative direction to the programs and activities of the departments. Within the departments, depending on the scope and specialization of the programs, are divisional committees. The eight department chairmen and the Director make up the Graduate School Council. Similar committees direct other Graduate School programs.

TEACHING

The faculty of the Graduate School is recruited principally from scholars employed in the Federal service. Most of the faculty members have had experience as teachers in colleges and universities throughout the country before coming into their positions in the Federal Government. Their desire to keep academic contacts and their liking for teaching attract them to evening classes offered by the Graduate School. Because they are doing during the day substantially what they teach in the evening, they bring a fresh academic point of view and a practical approach to the class room. There is a challenge in teaching a class of adults that provides additional motivation for the teacher and additional stimulus for the student.

LIBRARY RESOURCES

The student body of the Graduate School enjoys the use of the noted library facilities of Washington. In addition to a large library in the Department of Agriculture, containing more than one million volumes on both agricultural and non-agricultural subjects, the students have ready access to the rich storehouses of the Library of Congress, the Smithsonian Institution, the National Archives, and other exceptional special libraries. Supplementing the Department Library is a collection of books supplied directly, as necessary, by the Graduate School.

PUBLIC LECTURES AND SEMINARS

Public lecture series give Department employees and others an opportunity to hear authorities discuss current problems in agriculture and in other national and world affairs. Lectures that are especially relevant to the needs and interests of Department employees are given during official working hours.

PROGRAMS FOR FEDERAL EMPLOYEES OUTSIDE OF WASHINGTON

The Graduate School is deeply interested in increasing the educational opportunities of field employees of the Federal Government and is glad to cooperate in programs for them organized by other educational institutions. In recent years, the Graduate School has assisted New York University, Boston University, and Temple University in the establishment of special course programs for Federal employees in their areas.

COOPERATIVE INTERNSHIP PROGRAM WITH LAND-GRANT INSTITUTIONS

Post-graduate and post-doctorate personnel in Land-Grant Colleges and Universities are afforded opportunities for research and for gaining other desirable experience under this program developed jointly by a committee from the Graduate Council of the Association of Land-Grant Colleges and Universities and the Graduate School. This work is under the direction of the Department of Agriculture professional staff in Washington, the Agricultural Research Center and elsewhere. Specific arrangements under this program are between personnel from these educational institutions and agencies in the Department. Details may be had from the Office of Personnel or the Graduate School.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT

Certified Statements of Accomplishment are offered in the fields of Accounting, Administrative Procedures, Editorial Practices, Me-

teorology, Oceanography, Public Administration, Statistics, and Surveying and Mapping upon the student's completion of specified programs of study. Each student interested in earning a Certified Statement of Accomplishment in any of these fields should receive approval, from the Registrar, of his proposed program of study. For complete details see the outlined program in the Department concerned.

These statements are offered to encourage the student to complete a well-organized program in his chosen field of study or work. Each student who receives a certified statement also is given an informational transcript of his completed program, which he may use as a public record of qualification. At the student's request, an official transcript is sent to an institution or agency designated by him.

GRADUATE SCHOOL PUBLICATIONS

Publications of the Graduate School include:

1. A general annual *Catalog*—which contains detailed information about the resident educational program in Washington, D. C.
2. Time Schedule and Supplement, published each semester—fall, spring and summer—which carries added details about the resident educational program in Washington.
3. Books and periodicals, published at irregular intervals containing: original contributions by faculty members; special lectures devoted to the advancement of the arts and sciences; and significant manuscripts prepared by employees of the Department of Agriculture, which the Department has been unable to publish. A partial list of these publications is given on the outside back cover of this *Catalog*.

CORRESPONDENCE PROGRAM

The small correspondence program of the Graduate School is designed primarily for the field employees of the Department of Agriculture, although the courses are open to others as the facilities permit. There are many other courses not offered by the Graduate School that are of interest to Department employees and are available through the correspondence programs of the colleges and universities throughout the country. The Graduate School is happy to assist a student to find courses in which he is interested.

The courses offered by the Graduate School are listed on page 109 of this *Catalog*. Students who wish more information about any of the courses or who wish to register in one of the courses should write to the Registrar, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

Regulations and Procedures

ADMISSION

Admission to resident courses in the Graduate School is open to all qualified employees of the Federal Government, and to other qualified persons.

ENTRANCE REQUIREMENTS

Because the Graduate School does not offer degree programs, entrance requirements differ with the level of the course for which the student is registering.

Undergraduate courses, in general, are open to persons who are graduates of a standard high school or equivalent, or who qualify for the course because of satisfactory work experience. For admission to more advanced courses, college work in the same or related field is specified or understood. For other courses definite prerequisites may be stated. Year courses require the completion of the work of the first semester or its equivalent.

VETERANS

Graduate School resident courses are available to veterans under the provisions of Public Law 550. Registration for part-time study is charged against educational benefits only in the proportion that the number of semester hours bears to a full normal load.

Veterans who are re-entering Graduate School classes after an interruption of training, or who are entering the Graduate School for the first time, are advised to consult the Registrar of the Graduate School in advance of registration so that a program may be determined and the necessary arrangements made with the Veterans Administration.

SCHOLARSHIPS

Each semester the Graduate School offers scholarships, in the form of free tuition for one course, to persons who are the principal participants in the interdepartmental management intern programs operated by the Civil Service Commission. There are also available a limited number of similar scholarships for qualified Federal and District Government employees. Applications for these scholarships should be made by May 15 to the personnel offices of the Federal departments and agencies. The recipients will be selected by the Scholarship Committee of the Graduate School from the nominations presented by the agencies.

COUNSELING SERVICES

Officers of the Graduate School are available, throughout the registration periods and from 9:00 a.m. to 5:00 p.m. each day, for counseling on educational plans, whether courses are to be pursued in the Graduate School, or in other institutions. In addition, where necessary, arrangements are made to refer persons having special problems to authorities in a particular field of work or study.

TRANSFER OF CREDIT

Careful planning is important for any prospective student, but particularly so for the Federal employee who wishes to make a substantial beginning in his educational program through the Graduate School, where degrees are not granted and credits must eventually be transferred to a degree-conferring institution. A student cannot assume that credit for work done at the Graduate School will be accepted by any particular college or university. Universities generally accept transfers of credit on the basis of the individual courses taken, the student's over-all program, and the quality of the work done by the student.

The student who wishes to take an advanced degree should consult *in advance* the dean of the graduate school of the institution where he expects to become a candidate for his degree to secure approval for whatever portion of his program the institution of his choice will accept from the Graduate School. The student who is deficient in basic undergraduate courses needed as a foundation for his graduate program will find many of them available in the large undergraduate program of the Graduate School. Others may be found in local universities.

A student who is planning work toward an undergraduate degree should consult *in advance* the dean of the institution from which he expects to receive the degree if he wishes credit toward the degree for work taken at the Graduate School.

REGISTRATION

The registration period for each semester is shown on the school calendar on the inside front cover. A late fee per course is charged for registration after the opening of the semester. After the second week of classes in the fall and spring semesters, and after the first week in the summer session, students may register for credit only with the approval of the instructor and the Registrar. Registration is not completed until the required fees have been paid.

COURSE LOAD

Students employed full time may carry more than two courses only with the permission of the Registrar.

FEES

Course Fees. In general, fees are computed at \$12.00 per semester hour credit.

Late Fees. There is a \$2.00 per course late registration fee and a \$1.00 per course late transfer fee as shown in the School Calendar.

Reinstatement Fee. Students who fail to meet payments when due are charged a reinstatement fee of \$2.00 per course in addition to all accrued fees.

Laboratory Fees. Laboratory or materials fees are listed in the Schedule of Classes for each semester, in connection with the courses for which they are charged.

Service Fee. A fee of \$1.00 per course is charged each student using the deferred payment plan.

Transcript Fee. There is a 50¢ fee for each copy of a student's record on the regular Graduate School form or on the form of another institution or state board of education.

PAYMENT OF FEES

Fees are due and payable in advance at the time of registration. Registration is not complete, and no student is permitted to attend classes until all fees have been paid.

An arrangement can be made at the time of registration for payment of fees in two installments, one half plus a service fee at the time of registration, and the balance by the end of the fourth week in the fall and spring semesters, and by the end of the second week in the summer session.

A student who fails to meet payments when due will be suspended and may not attend classes until he has been reinstated and has paid all accrued fees as well as a reinstatement fee of \$2.00 per course.

All fees are payable at the Graduate School business office, Room 1031, South Building, United States Department of Agriculture.

ATTENDANCE AT CLASSES

Students are expected to attend all class sessions and not to absent themselves without adequate reason.

Absences do not relieve the student from responsibility for work required while he was absent, and the burden of proof that the

work was done rests with the student. In courses in which the work cannot be satisfactorily tested by written examination, the instructor shall be the judge of the relation of the student's attendance or non-attendance to his grade. A student registered for credit who is absent more than 25 per cent of the class periods receives a mark of "W," withdrawn, unless he makes up all required work. Auditors who are absent more than 25 per cent of the class periods receive the mark of "W."

CREDIT AND GRADES

Academic Credit. Persons registering for academic credit must satisfy all prerequisites for admission to the course as generally stated or specified in the course description.

Audit. An auditor must meet the same prerequisites as a credit student. He receives full privileges of class participation if he chooses to exercise them. An auditor does not receive a grade; he receives only a mark of AUD.

Change from Audit to Credit. A student may change his registration from audit to credit, or vice versa, within thirty days after the beginning of the semester in the fall and spring, and within three weeks after the beginning of the summer session. The request for change must be made in writing to the Graduate School. Special forms are available at the School office.

Grades. At the close of the semester students receive written notice by mail of grades received. The following letter grades are used:

A	Excellent
B	Good
C	Fair
D	Passable
F	Failure
Aud	Auditor
Inc	Incomplete
W	Withdrawn

TRANSCRIPT OF CREDIT

Inclusion in Personnel Record for Department of Agriculture Employees. To aid in effecting its promotion-from-within policy the Department has provided (USDA Administrative Regulations, Title 8, Chapter 42, paragraphs 1548-1551, dated 10-13-48) that a record of Graduate School credits earned by its employees will be placed in official personnel files of the agency. Unless specifically requested by the employee that such action not be taken, the Graduate School will forward, upon completion of the courses or at the

end of the year, a copy of the student's record, without cost to the employee, to the personnel officer of the unit of the Department of Agriculture in which the student is employed.

Transcripts for Employees of Other Agencies. Students who are not Department of Agriculture employees may obtain a transcript for their personnel files or for other purposes by requesting it in writing from the Graduate School, with the payment of the transcript fee of fifty cents.

WITHDRAWAL AND REFUNDS

Application for withdrawal from Graduate School classes must be made in writing to the Registrar. A form for this purpose is available in the Graduate School Office. *Reporting the dropping of a course to an instructor does not constitute an official withdrawal.* Permission to withdraw will not be given to a student who does not have a clear financial record.

Refund of tuition fees only will be granted in cases of official withdrawal according to the following schedule:

<i>Fall and Spring Semesters</i>	<i>Refund</i>
During first and second weeks of term	Tuition less \$5.00 per course registration fee.
During third and fourth weeks of term	60 per cent of tuition (a minimum of \$5.00 per course will not be refunded).
During fifth and sixth weeks of term	50 per cent of tuition.
<i>Summer Session</i>	
During first week of session	Tuition less \$5.00 per course registration fee.
During second week of session	60 per cent of tuition (a minimum of \$5.00 per course will not be refunded).
During third week of session	50 per cent of tuition.

Refunds will be computed as of the date the application for withdrawal is received in the Graduate School Office. In no case will tuition be reduced or refunded because of non-attendance at classes. No refund will be made of laboratory or other incidental fees.

Because commitments for instruction and other arrangements are necessarily made in the beginning of the semester, no refunds for any reason can be made except in accordance with the above schedule.

The Graduate School reserves the right to cancel any course if registration does not warrant continuance; to limit, to discontinue, to postpone or to combine classes; to change instructors; to change classroom assignments; to make any changes deemed advisable in registration and in fees; and to require the withdrawal of any student at any time for such reasons as the School deems sufficient.

Courses of Instruction

Courses offered during the academic year 1957-58 are listed on the following pages by departments of instruction. The departments are listed alphabetically.

The words Fall, Spring and Summer indicate the semester in which the course is offered. The number of credits indicates the value of the course in semester hours. Bracketed numbers indicate courses that will not be offered in 1957-58.

Courses numbered 1-100 are non-credit; 100-399, undergraduate; 400-699, advanced undergraduate (senior) and graduate; above 699, graduate only.

Biological Sciences

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—O—

Scientific efforts have been greatly intensified in recent years with the result that research discoveries have a direct bearing on the activities of every individual and organization. Many government workers in fields only indirectly related to biology often need an understanding of basic principles in the biological sciences to do a competent job in their own fields. On the other hand, government workers in the biological sciences are continually faced with the problem of keeping abreast of the rapid advances in the application of these principles and new gains in basic knowledge.

The Department of Biological Sciences has arranged a series of courses to meet the needs of each of these groups. Unless laboratory work is specified, the courses are non-laboratory. The advanced courses are taught as seminars. All of the courses are taught by outstanding specialists from Federal and other research institutions.

In addition to the courses listed below, the Graduate School offers several courses in the biological sciences at the National Institutes of Health in Bethesda. These courses may be found on page 101 of this catalog.

—O—

1-126. Disease Classification and Medical Terminology

Fall, 2 credits

LOUISE BOLLO

Designed for medical secretaries, librarians, diagnosis coders, social workers, statisticians, and other workers in various health programs. Sources and meanings of the hundreds of disease entities encountered in hospital records, death certificates, causes of disability, etc. and the basic principles of disease classification. Helpful to persons who are interested in the tabulation and measurement of disease but who have not had a formal medical education. *Prerequisite:* Some college training or experience in health work is helpful but not essential.

1-435. Recent Advances in Entomology

Fall, 2 credits

CLARENCE H. HOFFMANN and SPECIALISTS

Lectures and discussions on specific areas of entomology research, including up-to-date information on such topics as the control of livestock pests, the role of insect pathogens as biological control agents of destructive pests, new techniques in the classification of insects, advances in the development of plant varieties resistant to insect attack, hazards associated with the widespread use of insecticides, control of stored product insects, influence of new legislation on the use of insecticides and its relationship to future insect control recommendations, control of forest insects, insects as vectors of plant diseases, advances in insect physiology, the role of chemistry in the development of insecticides and in the analysis of residues, and recent progress on insect attractants. This class meets at the Plant Industry Station, Beltsville, Maryland. *Prerequisite:* Basic training in entomology.

1-570. Design of Experiments in Biological Sciences

Year, 2 credits each semester

E. JAMES KOCH

A course in the principles of planning and analyzing animal and plant experiments. The basic design principles of completely randomized, randomized block, Latin Square, factorials, confounding, split plot, lattices, incomplete blocks and other designs are fully discussed and illustrated with student problems. The principles and application of correlation, regression, covariance, multiple regression, experimental and sampling errors, components of variance, missing data, mean separation, individual degrees of freedom, size of plot, and size of experiment to experimental design are studied. Problems of special interest to the students are considered. This class meets at the Plant Industry Station, College Park, Maryland. *Prerequisite:* A course in experimental statistics, general familiarity with standard error, analysis of variance, regression, correlation, chi-square, t tests, and F tests, or experience in applying the principles of statistics to experimental data.

1-603. Advances in Plant Breeding and Genetics (1957-58 and every third year)

Fall, 2 credits

MARTIN G. WEISS and SPECIALISTS

Methods of breeding naturally self- and cross-pollinated plants, theories of early generation testing, nature and use of heterosis in plant breeding, techniques of self-pollination and hybridization, and plant improvement through interspecific hybridization and polyploidy. *Prerequisite:* Basic knowledge of genetics and plant breeding.

1-635. Bacteriological Instrumentation

Spring, 2 credits

HERMAN C. ELLINGHAUSEN

Construction, theory, and application of various instruments and special techniques used in bacterial metabolism with a limited amount of practical demonstration. Subjects to be covered: Colorimetry, nephelometry, spectrophotometry, infra-red techniques in bacteriology, cell free extract methods, Thunberg method, Warburg technique, pH, and various miscellaneous methods such as acid base chemistry, microbiological assay, analysis for carbohydrates and nucleic acids, techniques of immunochemistry, and chromatographic analysis. This class meets at the Agricultural Research Center, Beltsville, Maryland. *Prerequisites:* 1-628, Advanced Bacteriology—Bacterial Metabolism, or equivalent. Desirable background courses: biochemistry and quantitative analysis.

1-640. Biochemical Characteristics of Pathogenic Bacteria and Their Mechanisms of Pathogenicity

Fall, 2 credits

HERMAN C. ELLINGHAUSEN

Designed to give a background in the biochemical characteristics of pathogenic bacteria and their mechanisms of pathogenicity. Subjects to be covered: the meaning of pathogenicity, the historical aspects, general concepts of cultivation, pH ranges for growth, thermal disinfection and pasteurization, redox measurements, the role and chemical nature of the bacterial capsule, proteolysis (attack upon proteins, peptides, and the causative enzymes), transforming factors, pathogenicity, and chemotherapy, inhibition of growth by general means and via antibiotics, mechanisms of survival, virulence as a physiological problem, the role of toxins in pathology, pathogenesis of diphtheria, botulinum and tetanus toxins, *M. tuberculosis*, *B. anthracis*, *P. pestis*, and pathogenic fungi. Seminar: individually arranged meeting and guidance in the preparation of a term paper dealing with the subject of pathogenicity. This class meets at the Agricultural Research Center, Beltsville, Maryland. *Prerequisite*: Introductory bacteriology, general chemistry, the equivalent, or the consent of the instructor. Desirable background courses: bacterial metabolism, bacteriological instrumentation, biochemistry, pathogenic bacteriology, and immunology.

1-650. Outlines of Enzyme Chemistry and Their Bacteriological and Chemical Significance

Spring, 2 credits

HERMAN C. ELLINGHAUSEN

Designed to give background in various aspects of enzymes and their biochemical applications to bacterial physiology. Subjects to be covered: historical aspects, equilibria, methods of isolation, estimation of purity, characterization, action of inhibitors, temperature effects, effect of hydrogenation concentration, energetics, oxidation-reduction potentials, enzyme substrate compounds, enzyme specificity, classification of coenzymes, classification of enzymes, respiratory enzymes, metabolic patterns, glycolysis, hexose monophosphate shunt, tricarboxylic acid cycle, oxidative phosphorylation, synthesis of enzymes, reaction rates, and effect of substrate concentration on velocity. Seminar: guidance in preparation of a term paper dealing with enzymology. This course meets at the Agricultural Research Center, Beltsville, Maryland. *Prerequisite*: General college chemistry, organic chemistry, bacterial metabolism, college physics, the equivalent, or the consent of the instructor. Desirable background courses: biochemistry and instrumentation.

SPECIAL PROGRAM IN PLANT QUARANTINE STUDIES

The following courses form a special in-service training program in plant quarantine studies, and are given at the New York City facilities of the Division Training Center, Plant Quarantine Division, Agricultural Research Service. The program is under the supervision of Ira A. Lane, Training Officer, Plant Quarantine Division, Agricultural Research Service.

1-515. Plant Quarantine Entomology

Schedule to be arranged, 6 credits

THOMAS G. DARLING, MAYNARD J. RAMSAY, IRA A. LANE

A concentrated, technical course in entomology especially designed to fill a need on the recognition to family of immature forms frequently encountered in

plant quarantine work; to familiarize the participant with insect pests, the hosts, distribution and avenues of entry to notoriously dangerous forms not known to be established or widely distributed in the United States.

1-535. Basic Training¹ for Plant Quarantine Inspectors

Schedule to be arranged, 10 credits

THOMAS G. DARLING,

IRA A. LANE, WILLIAM FRIEDMAN, CHARLES S. TUTHILL

A consecutive 26-week program for new Federal plant quarantine inspectors designed to orient the new employee in the Department of Agriculture, its organization, function and basic personnel policies; basic legislation and other legal authorities affecting plant quarantine operations; principles of plant quarantine enforcement; Federal-State relationships; inspection and treatment techniques and procedures; technical aspects of foreign pest evaluation; identification and distribution in the fields of entomology, plant pathology, and nematology as applicable to foreign plant quarantine enforcement; commodity recognition as applicable to plant materials moving in international commerce.

1-615. Plant Quarantine Pathology

Schedule to be arranged, 4 credits

CHARLES S. TUTHILL

A specially designed program for regulatory officials interested in quarantine phytopathology. Emphasis is placed on detection, recognition, and nomenclature of disease-causing organisms frequently encountered in plant quarantine operations, particularly those not known to occur or be widely distributed in the United States.

1-708. Plant Quarantine and Plant Protection

Schedule to be arranged, 10 credits

MAYNARD J. RAMSAY

A special course arranged for foreign trainees who are studying plant quarantine methods in the United States. Course includes study of the interrelationships of agencies of the U. S. Department of Agriculture, regulatory and control organization and policy, basic quarantine legislation, fundamental principles affecting promulgation of quarantines and restrictive orders. Field observations and participation in operational activities of the Plant Quarantine Branch at ports of entry. Review and observation of field control projects and quarantine operations in the Northeast, Southeast, and Southwest Regions.

1-709 Plant Quarantine Nematology

Schedule to be arranged, 6 credits

WILLIAM FRIEDMAN

Graduate level study and practice in the detection, isolation, preparation, and identification of nematodes of plant quarantine significance. Special emphasis on host relationships, world distribution, and applicable treatments. Guest lecturers.

Languages and Literature

DEPARTMENTAL COMMITTEE

J. KENDALL McCLARREN (Chairman)

J. P. BLICKENSERFER

WALTER B. EMERY

ERWIN JAFFE

FOSTER E. MOHRHARDT

KENNETH W. OLSON

PATRICK O'SULLIVAN

FRANKLIN THACKREY (Vice-chairman)

IMPORTANCE OF ENGLISH, WRITING AND SPEECH

Among students preparing for technical careers and among busy people employed on the basis of their technical competence, there is an inevitable tendency to concentrate on subject-matter specialties. Technical knowledge is of no value, however, unless it can be communicated to others. It is common knowledge in the Government service and in industry that nothing so much retards the progress of many young technicians, scientists, and other professional personnel as their inability to write and speak effectively.

CERTIFICATE OF ACCOMPLISHMENT IN EDITORIAL PRACTICES

Certified Statements of Accomplishment in Editorial Practices are granted to students who have completed an organized course of study intended to provide basic training for responsible editorial and publications work. The program leading to this certificate should be of special interest to persons who wish to enter editorial work and to those now employed in editorial or publications work who wish to prepare themselves for job advancement.

Persons who wish to enter the profession should have a good general educational background. It is recommended that students who wish to work toward the certificate have at least two years of college work, preferably a college degree, or work experience in a subject matter field.

Requirements

Students seeking this certificate should consult with the Registrar and obtain approval of their proposed course of study early in their academic program. Equivalent courses will be accepted by transfer from other institutions.

1. A demonstrated facility in English grammar and composition. This requirement may be met by successful completion of an examination to be given as a part of the course, Principles of Editing.

2. Twenty-four semester hours of credit with an average grade of "B" or better in the following courses:

a. Required courses: (14 credits)

Principles of Editing (3)
 Advanced Practice in Editing (3)
 Printing Procedure and Layout Design (2)
 Editing Technical Manuscripts (2)
 Preparation of Publications for Mass Audience (2)
 Problems in Editing (3)

b. Editing Electives: (6 credits selected from the following)

Introduction to Official Writing
 Workshop in Official Writing
 Readable Writing
 Technical Writing
 Basic Reference Service and Reference Tools
 Introduction to Bibliographic Science
 Indexing
 Graphic Methods of Presenting Statistics
 Feature Writing

- c. Subject Matter Electives:* Four hours credit in subject matter courses as recommended by the student's employer or as selected by the student. May be selected from the Editing Electives listed above if those are appropriate to the position for which the student is preparing. The four hours may be waived by the Graduate School departmental committee for students who have college work or acceptable experience in the subject matter field.



ENGLISH—GRAMMAR AND WRITING

2-35. English for Secretaries—Rapid Review

Summer, non-credit

JAMES O. HARMON

Sentence structure, capitalization, punctuation, vocabulary, and spelling.

2-95. Improving Reading Ability

Fall, non-credit. Repeated in Spring and Summer

CARL MURR

A course to improve individual reading skills and techniques. Students are given training to increase their reading rate without loss in comprehension. Tachistoscope and silent reading films are used for group training with additional time for individual training with the reading accelerator. Course also includes ophthalmograph and telebinocular tests to determine eye movements and visual acuity.

2-112. Practical English Usage

Fall, 2 credits. Repeated in Spring and Summer

CHARLOTTE MANGOLD
DOROTHY P. PRITZKER
VERNE L. SAMSON

This course enables students through practice to master the fundamentals of correct English. Troublesome problems of English usage, sentence structure, choice of words, style, and grammar, are studied as aids to clear and forceful writing of letters, memoranda, and reports.

2-119. Vocabulary Building

Fall, 2 credits. Repeated in Spring and Summer

CHARLES D. MURPHY

Study of the sources and origins of words in order to gain insight into their present meanings. Principles of word formation; dictionary study and exercises in word selection. The course stresses the most common Latin and Greek roots used in forming English words.

2-222. English Composition

Year, 3 credits each semester

KAY B. WEBER

Equivalent of college freshman English. An introductory course in writing and English usage, designed especially for those who need a course preparatory to more advanced English studies. Special attention given to the fundamental principles and mechanics of good writing—grammar, punctuation, spelling, diction, etc. Exercises in writing short and long themes and in studying, analyzing, and evaluating selected English prose texts. *Prerequisite:* High school English or equivalent.

2-223. Descriptive English Grammar

Fall, 3 credits

SUSAN E. HARMAN

A course in the study of grammatical principles, stressing sentence structure and correct English form. Lectures on the history and development of inflectional and derivational forms. Exercises in diagramming and in analyzing examples of good and bad English.

2-224. Readable Writing

Spring, 2 credits

AMY G. COWING

Teaches you how to write so that more people will read and understand your articles and bulletins; how to estimate how easy or hard the reader will find your writing; how to organize your writing for easy reading. Deals briefly with the use of pictures and other visual aids to reading. Much of the course centers around use of the Flesch Readability Formula and consists of lectures and workshop sessions in which students make practical application of writing principles.

2-226. Introduction to Official Writing

Fall, 2 credits. Repeated in Spring

J. KENDALL McCLARREN
WILBERT SCHAAL

This course covers the principles of clear statement, which must be applied to all forms of writing. Emphasis is given to the special requirements of official writing in economic and scientific research, government organization, and policy. The course considers ways of making official writing clear, vigorous, and readable in spite of the necessary rules and restrictions. It is designed for people who are not professional writers but whose work calls for some copy preparation or report writing. One major writing project is required. *Prerequisite:* College freshman English or the equivalent in writing experience.

2-227. Workshop in Official Writing

Spring, 2 credits (alternate years)

J. KENDALL McCLARREN

This course is a continuation of Introduction to Official Writing. The informal workshop approach is designed to meet the individual needs of students whose work requires some writing. Writing principles developed in the previous course are applied to reports, scripts, releases, and other media. *Prerequisite:* Introduction to Official Writing or its equivalent.

2-230. Sentence Revision

Spring, 2 credits

VERNE L. SAMSON

Designed for students who wish to improve their writing. Review of the grammatical elements of the sentence, a study of established patterns of sentence construction, and constant practice in rewriting sentences. *Prerequisite:* Completion of Practical English Usage, Descriptive English Grammar, or the consent of the instructor.

2-235. Fiction Writing

Fall, 2 credits. Repeated in Spring

OLGA MOORE ARNOLD

Stresses such fiction fundamentals as plotting, characterization, dialogue, story organization, testing readability and interest, and increasing dramatic quality of writing. Emphasizes writing techniques that increase salability of student manuscripts by discussing editorial taboos, ways to obtain salable story ideas, and methods of marketing manuscripts.

2-242. Fiction Writing Workshop

Spring, 2 credits

OLGA MOORE ARNOLD

Discussion, criticism and suggestions for revising student manuscripts. Emphasizes methods of slanting for particular markets, discussions of what editors buy and why, and ways to polish manuscripts to increase sales possibilities. *Prerequisite:* Fiction Writing or equivalent.

2-280. Feature Writing

Fall, 2 credits

HAROLD H. SOURS

Stresses how to find article ideas, how to do the research necessary to develop them into salable articles, best methods of presentation of material, ways to polish writing to make it more salable, ways to determine magazine needs, how to slant material for particular magazines, and how to test readability and interest of writing.

2-281. Feature Writing Workshop

Spring, 2 credits

HAROLD H. SOURS

Discussion, criticism and suggestions for revising student manuscripts. Emphasizes methods of slanting for particular markets, discussions of what editors buy and why, and ways to polish manuscripts to increase sales possibilities. *Prerequisite:* Feature Writing or equivalent.

2-450 Technical Writing

Fall, 2 credits

MARGUERITE GILSTRAP and MAURICE FRIED

A course designed to help scientists and economists improve their research reports and articles for professional publications. The first three weeks are devoted to a survey of the fundamentals of writing the technical report: its characteristics, parts, functions, the steps in preparation, the process of criticism. The remainder of the term is spent in the preparation, criticism, and revision of

reports and articles—written for official use when possible. *Prerequisite:* Undergraduate degree in one of the sciences, engineering, economics, or similar technical field.

4-330. **Government Letter Writing** (See p. 47)

4-421. **Writing Procedures and Instructions** (See p. 48)

LITERATURE

2-330. Great Books

Year, 2 credits each semester *

M. CLARE RUPPERT

Group discussion, under leadership, of important works in poetry, history, philosophy, and criticism. The leader will try to help with the reading and understanding, but the books themselves will be the teachers. The intention of the course is to give insight into perennial, and therefore contemporary, problems, not historical and literary information. The only qualifications required are an interest in ideas and belief in free discussion. With few exceptions, the books will be read in their entirety. One, two, or three meetings will be given to a book, depending upon its length. Discussion will center around the following authors:

Reading List A (1958-59 and alternate years)

Fall Semester: Bible, *Ecclesiastes*; Homer, *Iliad*; Aeschylus, *Oresteia*; Sophocles, *Oedipus at Colonus*; Plato, *Symposium* and *Republic*, Bk. VI-VII; Aristotle, *Ethics*; Thucydides, *History of the Peloponnesian War*; Epictetus, *Discourses* (Selections); Lucretius, *On the Nature of Things*.

Spring Semester: Bible, *Gospel According to St. Matthew*; Shakespeare, *Macbeth*; Milton, *Areopagitica*; Adam Smith, *Wealth of Nations*; Descartes, *Discourse on Method*; Swift, *Gulliver's Travels*; de Tocqueville, *Democracy in America*; Thoreau, *Civil Disobedience*; Kant, *Perpetual Peace*; Mill, *On Liberty*; Twain, *Huckleberry Finn*.

Reading List B (1957-58 and alternate years)

Fall Semester: *Declaration of Independence*; Bible, *Book of Job*; Homer, *Odyssey*; Sophocles, *Antigone* and *Oedipus Rex*; Plutarch, *Lives: Alexander and Caesar*; Plato, *Apology* and *Crito*; Aristotle, *Politics*, Bk. I; Marcus Aurelius, *Meditations*; St. Augustine, *Confessions*; St. Thomas Aquinas, *On the Law*.

Spring Semester: Dante, *Divine Comedy*; Machiavelli, *The Prince*; Shakespeare, *Hamlet* and *King Lear*; Hobbes, *Leviathan*; Rousseau, *Social Contract*; Locke, *Civil Government*; *Federalist Papers*; Marx, *Communist Manifesto*.

2-231. Significant Books of the Twentieth Century

Summer, 2 credits

M. CLARE RUPPERT

These books will be discussed in the light of their influence upon twentieth century man, his thought and behavior in our contemporary society.

Reading List

James, *Pragmatism*; Frazer, *Golden Bough*; Dewey, *Democracy and Education*; Keynes, *Economic Consequences of the Peace*; Lewis, *Babbitt*; Joyce, *Ulysses*; Mann, *Magic Mountain*; Ortega y Gasset, *Revolt of the Masses*; Freud, *Basic Writings*; Toynbee, *Study of History* (1 v. abridged)

* Students may attend both semesters or either semester.

2-339. The Literature of American Agricultural History

Fall, 3 credits

WAYNE D. RASMUSSEN

Designed primarily for persons interested in the historical approach to current problems in agriculture. Writings by those living during periods of major historical changes and by present-day historians are provided. The course consists of selected readings and discussion on the literature of the beginnings of agriculture in America, colonial agriculture, agriculture and the American Revolution, agriculture in the North and South prior to the Civil War, the Civil War and the agricultural revolution, the settlement of the West and the livestock industry, the rise of commercial agriculture, changes in agriculture during World War I, McNary-Haugenism and the depression, the New Deal, World War II and the new agricultural revolution, and the place of agriculture in American life. Class discussion will cover bibliographical sources as well as selected readings.

INFORMATION METHODS

2-220. Indexing

Fall, 2 credits

MAUDE K. SWINGLE and KATHRYNE B. KOZAK

This course is intended primarily for those interested in making indexes for periodicals, bulletins, reports, and books. Emphasis will be placed on general procedures and matters of policy as well as on basic principles and techniques. Specific types of indexing adapted to various subjects and popular style, contrasted with technical and scientific styles, will be studied. Examples of different kinds of indexes will be shown and opportunity given for practical work in the preparation of indexes, including the making of cross references, alphabetizing, and editorial preparation of index cards and manuscripts for the printer. *Prerequisite:* A knowledge of library or editorial work is desirable.

2-225. Principles of Editing and Their Application

Fall, 3 credits

F. L. ERHARDT and CATHERINE F. GEORGE

Intended primarily as a survey course for those seeking information on editorial techniques involved in handling manuscripts after they leave the author's hands and until they are issued in printed form. Discussion of the fundamental principles of editing, including the organization or rearrangement of material for effective presentation; rhetorical style in relation to subject matter; word forms, sentence structure and effective use of English; the Style Manual of the Government Printing Office; considerations governing titles, tables of contents, headings, footnotes, illustrations, literature citations and bibliographies, and statistical checking; the principles of table formation and arrangement; the relation of type to subject matter and the techniques of printing; and the fundamentals of indexing and proofreading. Opportunity is afforded to apply these principles in practical work in editing, which is then discussed in class. A trip to the Government Printing Office is arranged to note and study operations there.

2-360. Advanced Practice in Editing

Spring, 3 credits

GENIANA R. EDWARDS and SPECIALISTS

Advanced instruction in literary and statistical editing and handling of graphic materials. Students will edit a practice manuscript requiring reorganization, extensive editing, and uniform styling. Several Government agency styles for citation, tables, graphics, and other details will be compared, and adaptation of style meeting special requirements yet conforming to Government Printing Office rules will be studied. Administrative procedures for work on pamphlets, magazines, etc., will be outlined. *Prerequisite:* Principles of Editing and Their Application, or the consent of the instructor.

2-237. Printing Procedure and Layout Design

Spring, 2 credits

ELMO J. WHITE

Printing processes and printing media; composition; book binding; typography and design; printing types; illustrations, including photo-engraving process and photographs; printing design, rough layouts, finished layouts, methods of copy fitting; printing for the Government, including agency responsibility, GPO responsibility, and agency procedure for procuring printing; other printing media, including silk screen, ozalid, varitype, cold-type processes, and others; regulations and specifications of the Joint Committee on Printing, GPO paper catalog, Style Manual, printing and binding regulations.

The course is intended for those who plan, prepare, or procure printing, duplicating, and distribution of books, pamphlets, folders, posters, charts, forms, and other printed or duplicated matter.

2-412. Editing Technical Manuscripts

Fall, 2 credits

Instructor to be announced

The role of the editor, including necessary qualifications, the human relations aspect, relative responsibilities of the editor and author, and the ethical and practical basis for editing. Editorial evaluation of technical manuscripts, including organization of functional parts, sound procedural reasoning, correlation with technical work, style requirements, critical review, and preparation for reproduction. *Prerequisite:* Principles of Editing and Their Application, the equivalent, or the consent of the instructor.

2-415. Preparing Publications for a Mass Audience

Fall, 2 credits

DENNIS S. FELDMAN

Between the final editing and the time a pamphlet, brochure, or booklet comes off the press lies a multitude of details designed to enhance the popular appeal of the publication. The picture editor who lends his talents to make a publication come alive; the artist and layout man who creates visual appeal; the caption writer—all these key personnel bring their specialized skills to bear. These fields are discussed through the use of practical, working demonstration and lectures. Techniques of preparing a manuscript for a mass audience are considered. Special emphasis is placed on the use of techniques that combine appeal with readability through extensive use of graphic material. Students may bring to class problems or materials on which they are currently working. *Prerequisite:* At least three of the Graduate School courses in editing, or the equivalent in training or experience.

2-430. Problems in Editing—Seminar

Fall, 3 credits

JEROME H. PERLMUTTER

This course deals with the editorial problems that may arise in the planning, preparation, production, and printing of publications. *It is designed for the working editor, or the student who has successfully completed previous editorial course work.* Emphasis is placed on the on-job-problems of each individual. These are discussed in detail, and suggestions and recommendations are made for solutions. Organization of manuscripts, sentence structure, and direction of material for the proper audience are considered. Time is devoted to the relationships between editors and authors, artists and administrators. Management methods for improving publication flow are discussed. A field trip to a printing plant or editorial office is arranged. *Prerequisite:* Completion of the other courses required for the Certificate of Accomplishment in Editorial Practices, working publications editor, or the consent of the instructor, especially if a schedule conflict has prevented completion of the required courses.

2-065. U. S. Government Film Policies, Procedures, and Problems—Seminar

Fall, non-credit

SEERLEY REID and R. LYLE WEBSTER

Study and subsequent discussion of such problems as the extent of Government assistance to commercial film producers, methods of calculating film production costs, Government exchange of film materials and rights, price differentials in film contracts, personal credits on Government films, and the like. Government-wide policies and procedures will be studied in terms of legal considerations, program operations, and principles of public administration. Background fact papers will be prepared by selected participants.

Registration is required, but no fees are charged.

2-243. Using Visuals Effectively

Summer, 2 credits

J. KENDALL McCLARREN, ELMO J. WHITE,
DAVID M. GRANAHAN, and JULES RENAUD

This course is designed for persons who teach, conduct meetings, or plan visual programs for groups or mass communication. *An art background is not necessary.* The course will emphasize planning and creating simple but effective visuals, using modern techniques and devices. Main topics include: how to analyze an audience; how to develop visual ideas; and application of modern techniques. Demonstrations will be given in the use of motion pictures, closed circuit TV, 3-dimensional visuals, visual cast and various other speaker-controlled devices.

2-420. Communications Review for Executives

Fall, 2 credits

J. KENDALL McCLARREN (Coordinator), R. LYLE WEBSTER,
JAMES H. McCORMICK, KENNETH K. KROGH, and JULES RENAUD

This course is designed to clarify communications problems for persons in responsible supervisory positions and to enable them to perform more effectively when communications techniques are required. The course defines the role of communications in public administration and reviews the principles of oral and written communication. Special emphasis is given to conference methods and use of public media. Because of the broad base of subject matter offered in this course, the intent is to orient the administrator on communications practices and techniques in order that he may more readily recognize communications weaknesses and overcome them. Clinic and practice sessions will be held on report writing, directing meetings and conferences, speech preparation and delivery, dealing with public media. As part of the speech clinic, participants will prepare material for self-telecasting and delivery over closed circuit television. (This course is experimental. It is designed to capsule an important phase of administration for the busy executive. Each segment of the course is offered by a trained communications specialist operating in an executive capacity.)

LIBRARY TECHNIQUES

The following courses are designed as non-professional library courses, offering a background of information and training for the sub-professional library assistant and other persons whose work requires a knowledge of these techniques, such as teachers, research assistants, and the like.

2-135. Introduction to Cataloging and Classification

Spring, 2 credits

FRANCIS J. WITTY

The philosophy of organization of the materials of communication; typical rules for descriptive and subject cataloging; the coordinate index and other

forms of indexing; the structure of systems of classification; the Library of Congress system of classification.

2-139. Cataloging and Classification II

Summer, 2 credits

FRANCIS J. WITTY

The course will present methods of cataloging and classifying more difficult materials such as technical reports, filmstrips, microcards, music, maps, and periodicals. It will take into consideration the more philosophical aspects of cataloging such as the theory of subject headings, the purpose of the catalog, and the like.

2-136. Principles of Library Organization

Spring, 2 credits

JOSEPH T. POPECKI

The system and function of a library based on its component parts and services that obtain regardless of size or purpose; the organization of function and service for utmost efficiency.

2-137. Basic Reference Service and Reference Tools

Fall, 2 credits

MARION E. BONNIWELL

The process of satisfying intellectual inquiry; sources of information; study and comparison of a basic list of 150 reference tools with the exception of general bibliography.

2-138. Introduction to Bibliographic Science

Fall, 2 credits

JOSEPH T. POPECKI

Bibliographic science and bibliographic style for beginners; variations and forms of bibliography; study and comparison of the general bibliographic tools and indexes of chief importance.

[2-145.] Law Librarianship (1958-59 and alternate years)

Year, 2 credits each semester

Instructor to be announced

A survey of source materials for the law library, and a study of library administrative procedures as applied to a law library. The first semester is concerned with source materials: primary authorities and secondary authorities, international law, government publications, and other materials. The second semester is concerned with law library service: organization and staffing, book selection, accessioning, cataloging, reference services, administrative records, and reports. Students may take either or both semesters. *Prerequisite:* Training in law or library work, or equivalent experience.

SPEECH

2-228. Fundamentals of Speech

Fall, 2 credits. Repeated in Spring

VIRGINIA B. ROSER

The course is designed for those who feel the need of more confidence and ability in meeting business, club, church, and social speech situations. The student-speaker who becomes so interested in an idea that he wants to share it soon discovers that he can communicate with greater confidence and effectiveness when he learns, by actual experience in weekly talks, how to organize his material and to deliver it in a direct conversational manner. Through constructive criticism from the instructor and practice in short extemporaneous speeches, panel discussions, and recorded reading from script, the student discovers the satisfaction and self-confidence that come from "freedom in speech."

2-229. Public Speaking

Fall, 2 credits

WALTER B. EMERY

Students enrolling for this course should have had Fundamentals of Speech or some speech-making experience. Emphasis is placed on determining what one's purpose is in speaking, and accomplishing that purpose effectively. How to be interesting and clear, how to develop and support ideas, and how to handle discussion. Each student speaks and receives personal speech suggestions at each class meeting.

2-232. Voice and Remedial Speech

Fall, 2 credits. Repeated in Spring

STANLEY L. BERLINSKY

WALTER B. EMERY

Study and intensive drills in voice production, flexibility, range, articulation, and enunciation. Training and practice are designed to improve vocal conditions for all speech purposes and to remedy minor speech difficulties. In order that students may receive more individual attention, registration is limited to twenty.

FOREIGN LANGUAGES

The Graduate School provides opportunities for instruction in a wide range of foreign languages. The person who is seeking the maximum practical value from a foreign language must learn not only to translate it, but also to think in it well enough for translation to be unnecessary. It is the aim of those responsible for these courses to conduct them so as to develop in their students a ready and intelligent use of the language.

2-63. The Main Languages of the World

Summer, non-credit

JACOB ORNSTEIN

The course is intended to familiarize the student with the features of the main languages of the world and their geographical distribution. Basic vocabularies will be presented of the French, German, Italian, Japanese, Portuguese, and Russian languages. Their structures will be discussed. The role of languages in world affairs will be described. *Prerequisite:* Two years of high school or one year of college work in a foreign language.

FRENCH**2-68. Reading French—Grammar Review and Vocabulary Building**

Fall, non-credit. Repeated in Spring and Summer

MARGUERITE ETIENNE

Basic French grammar, reading and vocabulary building for students who have had some French and wish to review it.

2-87. French for Travelers I

Fall, non-credit. Repeated in Spring and Summer

GERMAINE BARGIN

Acquiring a facility in the use of oral French, including practical, every-day expressions helpful to those who plan a trip to France, or to those who plan to work in a French-speaking country. For persons with or without previous study of the language.

2-97. French for Travelers II

Spring, non-credit. Repeated in Summer

GERMAINE BARGIN

Continuation of French for Travelers I. May be taken also by students who have an elementary conversational ability and wish to improve.

2-253. Elementary French

Year, 3 credits each semester

GERMAINE BARGIN

MARGUERITE ETIENNE

Provides basic knowledge of French grammar and vocabulary. Reading, translation, dictation, and some conversation. For beginners.

2-254. Intermediate French (1957-58 and alternate years)

Year, 3 credits each semester

GERMAINE BARGIN

Systematic review of French grammar. Writing of French composition, reading, translation, dictation, and conversation. For students who have had one year of college French, or two or three years of average grammatical preparation below college level.

2-255. French Conversation

Fall, 2 credits. Repeated in Spring

MARGUERITE ETIENNE

Designed to develop in students a fluent style of idiomatic conversation on topics most likely to be met in travelling in French speaking countries. Grammar review only if deemed necessary. Some composition and dictation exercises. Reading of current French newspapers and magazines. *Prerequisite:* Two years of college French or the equivalent; a good knowledge of grammar and a sizeable vocabulary.

GERMAN

2-66. Reading Scientific German

Fall, non-credit. Repeated in Spring

MARIANNE LEDERER

A course designed for those who need a reading knowledge of scientific German in order to meet the language requirements for an advanced degree. No previous study of the language is required.

2-76. Reading German—General Vocabulary

Year, non-credit

MARIANNE LEDERER

HERBERT SCHAUMANN

A course designed for those who need a reading knowledge of German with a non-scientific vocabulary, in order to meet the language requirements for an advanced degree. Vocabulary emphasis depends on the needs of the students registered. No previous study of the language is required, but the course may be used as a review.

2-88. German for Travelers

Fall, non-credit. Repeated in Spring

MAGNA E. BAUER

Accuracy and facility in the use of oral German through listening to spoken German, reading, word analysis, and particularly repetition of the "basic thousand words" in round-table conversation. Work will be adapted to the members of the class. The beginner will have a chance to acquire a working vocabulary; the more advanced student will have an opportunity to practice the correct use of words, phrases, and idiomatic expressions. For beginners in the language as well as those who have had one year or more of German.

2-259. Elementary German

Year, 3 credits each semester

MARIANNE LEDERER

Essentials of German grammar. Reading and writing simple prose. Introduction to extensive reading. Some conversation. Training in the fundamentals required to go on to Intermediate German.

2-260. Intermediate German

Year, 3 credits each semester

MARIANNE LEDERER

2-261. German Conversation

Fall, 2 credits. Repeated in Spring

MAGNA E. BAUER
MARIANNE LEDERER

Development of facility in discussion and reading, use of idioms, writing and thinking in the language. *Prerequisite:* Two years of college German, or the equivalent.

ITALIAN**2-270. Elementary Italian**

Year, 3 credits each semester

MAGNA E. BAUER

Essentials of Italian grammar. Reading and writing simple prose. Introduction to extensive reading, some conversation.

2-271. Intermediate Italian

Year, 3 credits each semester

S. BERNARD FINLAY

Grammar review. Extensive reading and vocabulary building to provide an adequate foundation for understanding Italian texts and carrying on conversation. *Prerequisite:* One year of college Italian, or two or three years of average grammatical preparation below the college level.

PORTUGUESE**2-290. Elementary Portuguese**

Year, 3 credits each semester (alternate years)

JACOB ORNSTEIN

Basic grammar and vocabulary. Reading, translation, and conversation. For beginners.

RUSSIAN**2-45. Review of Elementary Russian**

Summer, non-credit

GEORGE M. SAHAROV

General review of Russian grammar, accompanied by oral and written exercises. *Prerequisite:* A year course in elementary Russian, or the equivalent as approved by instructor.

2-295. Elementary Russian

Year, 3 credits each semester

GEORGE M. KORENEV ROCKWELL
GEORGE M. SAHAROV
EUGENIA TARAKUS

Designed to give the student a sound foundation in basic Russian. Includes reading, writing, and speaking. Special attention is given to the fundamental

rules of Russian grammar, Russian phonetics, and the mechanics of good reading and writing. The first semester covers the first 18 lessons of the textbook, "Bondar's Simplified Russian Method, Seventh Edition," and the second semester covers the second 18 lessons. Students should have a good knowledge of English grammar.

2-296. Intermediate Russian

Year, 3 credits each semester

GEORGE M. SAHAROV

Reading and translation, grammatical analysis, dictation and conversation in Russian. *Prerequisite:* One year of Russian, which included the completion of a basic grammar text, Bondar or the equivalent.

2-297. Conversational Russian

Year, 3 credits each semester

GEORGE M. SAHAROV

This course is alternated with Advanced Russian, depending upon student demand. For students who have had at least two years of Russian language training.

2-299. Advanced Russian

Year, 3 credits each semester

GEORGE M. SAHAROV

Reading and translation of more advanced Russian texts, composition in Russian, oral and written translation from English to Russian. Conversation. *Prerequisite:* Two years of Russian.

SPANISH

2-89. Spanish for Travelers

Fall, non-credit. Repeated in Spring and Summer

ODILON PONCE

Acquiring a facility in the use of oral Spanish, including practical, every-day expressions helpful to those planning a trip to a Spanish-speaking country. For persons with and without previous study of the language.

2-91. Know Our Latin Neighbors

Fall, non-credit

ODILON PONCE

An informal class in which current activities taking place in Latin America in the fields of agriculture, economics, education, health, and the like, will be the subjects of reading and conversation. General background on the life and customs of Latin America will be included. Other topics can be added to suit the particular interests of the members of the class. The materials used will be based mainly on magazine articles published in Latin American countries. *Prerequisite:* One year of Spanish or reasonable fluency in this language.

2-300. Elementary Spanish

Year, 3 credits each semester

ERWIN JAFFE

MARJORIE C. JOHNSTON

Foundation work in grammar, vocabulary, reading, and translation.

2-301. Intermediate Spanish

Year, 3 credits each semester

MARJORIE C. JOHNSTON

Grammar review, more difficult reading and translation, use of idioms, writing and discussion in the language. *Prerequisite:* One year of Spanish at college level, or two or three years below college level.

2-302. Spanish Composition and Conversation

Year, 2 credits each semester

G. MEDRANO DE SUPERVIA

Thorough training in the structure of the language, through reading and discussion of Spanish newspapers, magazines and novels of today. Writing of compositions, commercial and familiar letters; helping student acquire ability to speak and understand everyday and colloquial Spanish. *Prerequisite:* Intermediate Spanish or equivalent.

2-574. Advanced Spanish Conversation and Literature

Year, 2 credits each semester

RAFAEL SUPERVIA

Especially adapted for those having a fair knowledge of the Spanish language, and who want to improve it by the readings of and comments on the masters of Spanish literature. *Prerequisite:* Ability to read, understand, and express oneself clearly in Spanish.

Mathematics and Statistics

DEPARTMENTAL COMMITTEE

B. R. STAUBER (Chairman)

JOSEPH F. DALY
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THE STATISTICIAN AND HIS EDUCATION

Unprecedented dependence is being placed on statisticians by administrative officials in government and private business all over the world. The statistician, through his specialized training, is able to provide current and comprehensive information on many subjects, and to do so with speed and economy. His specialized techniques are indispensable in industry.

The making of a statistician is a long and exacting process—several years of graduate study, plus at least a year and a half of high-grade experience under competent leadership. Educational facilities are strained, not only because of the heavy and increasing demand but also because the educational requirements placed on the statistician today are of an entirely different order of magnitude than they were a few years ago.

The courses described on the following pages accordingly provide training not only in theoretical principles, but training also in the administrative and research uses of data, as well as in the collection and processing of data and in the development and supervision of the minor skills necessary for carrying out statistical work.

In the design of a survey the statistician is concerned with the reliability and the cost of the figures that are to be obtained. Reliability is affected by many sources of error, which can be classified under two groups: (a) biases that are common to both complete counts and samples; (b) sampling errors. A thorough understanding of both types of error is essential in the work of the statistician. The statistical courses listed on the following pages deal mainly but not entirely with sampling errors. Proficiency in one or another branch of subject-matter such as sociology, economics, agricultural science, engineering, or some other specialized field, is essential for a full appreciation of the first type of error and for that reason collateral studies in one or more fields of science are advised and in fact are insisted upon in work leading to a Certified Statement of Accomplishment in Statistics.

INTERNSHIPS IN SAMPLING

COMMITTEE

B. R. STAUBER (Chairman)

WILLIAM G. COCHRAN
MORRIS H. HANSEN
STERLING R. NEWELL

S. MCKEE ROSEN
IRVING SIEGEL
FREDERICK F. STEPHAN

In recognition of the need for statisticians with thorough theoretical training and with experience in large-scale statistical projects under competent leadership, and in recognition of the exceptional facilities in Washington for specialized training in this field, the Graduate School has undertaken to present to qualified students the opportunity to pursue their studies under a system of internships. Under this program a limited number of qualified persons have a unique opportunity to combine advanced study with practical experience in sampling.

Internship Program

The internships provide opportunity for research work under leading authorities. The program is planned on an individual basis, depending on the experience, training and interests of the candidate. The internships are intended to supplement, not supplant, work offered in universities.

The following agencies have cooperated in the program:

Agricultural Marketing Service	Bureau of the Census
Bureau of the Budget	Bureau of Labor Statistics
National Bureau of Standards	National Institutes of Health
National Office of Vital Statistics	

The internship consists of two integrated parts:

- (1) classroom training in courses at the Graduate School or at other educational institutions in the city;
- (2) work experience in government agencies on large-scale statistical sampling and testing programs.

Length: Twelve or eighteen months; the length of time spent in the internship is determined by the training and experience of the applicant.

Qualifications: Doctorate (a) in mathematical statistics, or (b) in a field such as agriculture, business, economics, social psychology, engineering. By arrangement, an intern may combine his internship with work on a doctoral thesis.

Selection

Each application is reviewed and approved or rejected by the Committee on Internships in Sampling. The Committee helps the intern plan his program and consults with him from time to time concerning his progress. Where the intern program is being developed as a research project, serving as a basis for a doctoral dissertation, the Committee keeps the university informed of progress.

Stipends

The internships carry no stipends. The Graduate School makes and offers no living arrangements.

Fees

The only fees charged are nominal course fees for those courses in which the intern is registered.

Application

Address the application to the Director, Graduate School, Department of Agriculture, Washington 25, D. C., and include the following information:

- | | |
|---|---|
| (1) Name | (5) Fields of specific interest and |
| (2) Date and place of birth | circumstances surrounding |
| (3) Transcripts of previous academic work | application (i.e., purpose, |
| (4) Citations or copies of publications or technical papers | whether applicant would devote full time to internship, etc.) |

Applications should be submitted well in advance of the beginning of the fall semester in September to insure adequate arrangement of work schedules and course programs.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN STATISTICS

A Certified Statement of Accomplishment is offered in each of three fields of statistical study—fields representing areas of statistical preparation and application most useful in the public service. The required program in each field is outlined on page 36. The student who holds a bachelor's degree and who completes the basic courses and earns 24 credits in specialized courses listed in any column, with substitutions only as specifically approved, is eligible to receive a Certified Statement of Accomplishment. It certifies that the student has completed a program of study which, in conjunction with collateral training in a subject-matter field of application, prepares him for effective public service in a particular statistical field.

COURSES LEADING TO CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN STATISTICS (With Concentration in One of the Following Fields of Application)

THE SOCIAL SCIENCES	THE NATURAL SCIENCES	MATHEMATICAL STATISTICS
BASIC COURSES—Required of all candidates		
College Algebra, Plane Trigonometry, and Analytic Geometry Principles of Statistical Analysis	College Algebra, Plane Trigonometry, and Analytic Geometry Principles of Statistical Analysis	College Algebra, Plane Trigonometry, and Analytic Geometry Calculus Principles of Statistical Analysis

SPECIALIZED COURSES

3-206. Calculus	3-206. Calculus	3-400. Introduction to Mathematical Sta- tistics
3-400. Introduction to Mathematical Sta- tistics	3-400. Introduction to Mathematical Sta- tistics	3-415. Higher Algebra
3-415. Higher Algebra	3-405. Introduction to Experimental Sta- tistics	3-735. Theory of Sample Surveys
3-435. Sampling in Social and Economic Surveys	3-415. Higher Algebra	3-752. Advanced Theory of Probability
or	1-570. Design of Experiments in Biologi- cal Sciences	3-571. Design, Philosophy, and Interpre- tation of Experiments
3-735. Theory of Sample Surveys		

ELECTIVE COURSES

3-502. Differential Equations	3-571. Design, Philosophy, and Interpretation of Experiments
3-532. Introduction to Linear Programming	3-752. Advanced Theory of Probability
3-533. Introduction to Operations Research	3-587. Problem Analysis
3-538. Methods of Mathematical Analysis	

MATHEMATICS

3-1. Review of College Freshman Mathematics

Fall, non-credit

HAROLD F. HUDDLESTON

A review course at the level of freshman mathematics. Algebra, trigonometry, analytic geometry. A brief introduction to the methods of the differential calculus. Emphasis on applications to statistical problems. *Prerequisite:* One year of college mathematics.

3-2. Review of Calculus

Spring, non-credit. Repeated in Summer

JOSEPH H. KUSNER

Variables, functions, limits, divided differences, derivatives, application of derivatives to geometry, engineering curve fitting and analysis. Transcendental functions, polar equations, differentials, mean value theorem, techniques of integration and engineering application. Series and expansion of functions. *Prerequisite:* Calculus.

3-5. Review of College Algebra

Summer, non-credit

PERRY R. TAYLOR

A review course for persons who have completed a course in college algebra and now need a refresher course either for their work or so that they may go on to more advanced courses in mathematics.

3-6. Preparatory Mathematics for Introductory Statistics

Summer, non-credit

GLENN W. SUTER

A beginning course for students with inadequate mathematical background who desire to begin the study of statistics at the introductory level. The course will cover basic operations of algebra, fractions, exponents, summation notation, manipulation of algebraic expression, logarithms, graphic representation of equations, solution of simultaneous equations, elements of probability, permutations and combinations, and mathematical expectation. Emphasis throughout will be on the parts of algebra used in statistics. Examples and problems will be drawn primarily from statistical operations.

3-100. Commercial Algebra

Fall, 3 credits (alternate years)

RALPH R. BOTTS

Fundamental algebraic operations applied to business problems involving simple interest, bank cash and trade discount, commutation of debts, partial payments and the equation of accounts, compound interest, and present value. Algebraic language and common commercial terms will be explained. Some attention will be given to the use of graphs, logarithms, simultaneous equations, quadratic equations and the binomial theorem as they apply to the solution of business problems. An intermediate course between Everyday Mathematics and Mathematics of Accounting and Investment.

3-102. College Algebra

Fall, 4 credits. Repeated in Spring

PERRY R. TAYLOR

The number system of algebra; algebraic expressions; elementary graphical methods; operations with polynomials; fractional expressions; linear equations; fractional exponents; radicals and complex numbers; quadratic equations; systems of equations in two unknowns involving quadratics; ratio, proportion, and variation; theory of equations; determinants; solution of equations by the inverse matrix; permutations, combinations, and probability; binomial theorem; progressions; infinite geometric series; inequalities; logarithms; mathematics of investment. *Prerequisite:* High school algebra and plane geometry.

3-103. Trigonometry and Analytic Geometry

Fall, 4 credits. Repeated in Spring

JOSEPH L. STEARN

Basic definitions and uses of trigonometric functions; logarithmic solutions; radian measure; fundamental identities; oblique triangles; polar coordinates, inverse trigonometric functions; complex numbers and De Moivre's theorem; graphs of the functions and the inverse functions; introduction to spherical trigonometry.

Fundamental concepts and formulas; line, circle, parabola, ellipse, hyperbola; transformation of coordinates; polar coordinates; parametric equations; the second and higher degree equation in rectangular coordinates; graphic solution of equations; introduction to solid analytic geometry. *Prerequisite:* College algebra.

3-104. Trigonometry

Summer, 2 credits

JOSEPH L. STEARN

Basic definitions and uses of trigonometric functions; logarithmic solutions; radian measure; fundamental identities; oblique triangles; polar coordinates, inverse trigonometric functions; complex numbers and De Moivre's theorem; graphs of the functions and the inverse functions; introduction to spherical trigonometry. *Prerequisite:* College algebra.

3-206. Calculus

Year, 4 credits each semester

JOSEPH H. KUSNER

First semester: Variables, functions, limits, continuity, derivatives. Applications of the derivative to geometry and physics. Maxima and minima. Differentials. Mean value theorem. Simple integration and applications to geometry and physics. Radius and circle of curvature. Vectors.

Second semester: Standard integral forms. Special methods of integration. Approximate integration. Improper integrals. Indeterminate forms. Taylor's formula with remainder. Infinite series. Partial derivatives. Multiple integrals. *Prerequisite:* Algebra, trigonometry and analytic geometry.

3-415. Higher Algebra (1957-58 and alternate years)

Year, 3 credits each semester

RANDALL D. ESTEN

Permutations and combinations, elementary probability, binomial and multinomial theorems. Theory of equations. Matrices, linear independence, orthogonality, partitioned matrices, and determinants; quadratic forms, linear transformations, latent roots of a matrix and characteristic function; numerical evaluation of determinants and solution of equations. *Prerequisite:* College algebra, trigonometry, and analytic geometry.

[3-502.] Differential Equations (1958-59 and every third year)

Year, 2 credits each semester

Instructor to be announced

Various types of ordinary differential equations. Solutions in series; the methods of Frobenius and others. Mechanical methods. Partial differential equations. Boundary problems. Fourier series and integrals; Legendre polynomials. Applications to conduction of heat and vibrating strings. Laplace's equation. Calculus will be reviewed as necessary. *Prerequisite:* Calculus.

3-509. Mathematics for Economists (1957-58 and alternate years)

Year, 3 credits each semester

RICHARD J. FOOTE

This course covers aspects of mathematics that are most useful to economists: algebra, geometry, differential and integral calculus, differential equations, and matrix algebra. At each stage, the mathematical methods described are used to solve problems based on economic theory or analysis. Part of the second semester is devoted to the use of matrix methods in fitting equations by least squares, in fitting systems of simultaneous equations, and in using such systems for analytical purposes. *Prerequisite:* A course in principles of economics.

3-532. Introduction to Linear Programming

Spring, 3 credits

SAUL I. GASS

Covers the basic theoretical and computational aspects of linear programming. The formulation of many problems are analyzed and computational techniques discussed. Includes the following topics: the optimization of a linear function subject to linear constraints, the simplex computational procedure, the duality theorems, the transportation problem, the contract awards problem, problems in production scheduling, additional applications, the equivalence of a zero-sum two-person game to a linear programming problem, parametric linear programming, and recent developments. Depending on the background of the students, the basic concepts of matrices, vectors and vector spaces, convex sets, and linear inequalities are discussed.

3-533. Introduction to Operations Research

Fall, 3 credits

THOMAS L. SAATY

This course is designed to give the student perspective and technique for handling operational problems. Covers the basic mathematics useful in operations research, including probability and statistics, the optimum distribution of effort, queuing theory, game theory, the variational method, and information theory. Operations research projects are assigned. *Prerequisite:* College algebra, working knowledge of analytic geometry.

3-538. Methods of Mathematical Analysis

Year, 3 credits each semester

THOMAS L. SAATY

The object of this course is to put at the disposal of the student mathematical techniques that have frequent application. From algebra, groups, matrices, equations, inequalities (linear programming and game theory) are discussed with applications. From analysis, differential equations (ordinary and partial), infinite series, general functions (convex and others), transcendental functions, and asymptotic phenomena. From topology, fixed point theorems and polyhedra with applications to differential equations and game theory. An introduction to differential geometry and tensors. *Prerequisite:* Calculus and differential equations.

3-587. Problem Analysis

Summer, 2 credits

THOMAS L. SAATY

This course aims at developing in the student the ability to solve problems of a logical, mathematical, physical, and operational nature, with special emphasis on practical problem solving. The course attempts to develop creativeness in the formulation and solution of meaningful problems. The major content of the course is based on contributions to the field made in the past ten years. *Prerequisite:* A course in calculus.

STATISTICS

3-126. Introductory Statistics

Year, 2 credits each semester. Repeated in Spring and Summer

C. M. PURVES

OTTO RAUCHSCHWALBE

The collection of data. The presentation of data in tables and charts. Different kinds of averages. Dispersion. Introduction to index numbers. Relations between two or more variables. Introduction to correlation theory, regression, and interpretation of samples. Practice in calculations. *Prerequisite:* High school algebra and geometry.

3-135. Elements of Statistical Drafting

Spring, 2 credits

NELSON P. GUIDRY

A practical course in drafting involving actual preparation of statistical maps and charts in class. Explanations of short cut methods of lettering technique and arrangement of component parts of illustrations. Complete illustrations will be prepared in ink ready for publication. The reduction, reproduction, and color application to statistical maps and charts will be explained. Students supply their own drafting tools.

3-136. Graphic Methods of Presenting Statistics

Fall, 2 credits. Repeated in Spring

R. G. HAINSWORTH

Analysis of statistical data to determine what form is best for graphic presentation. Application of data to the many types of illustrations in several forms of the various classes. Rough pencil layout examples of time series charts, frequency diagrams, graphic correlation charts, pictorial symbol charts, cartograms and other illustrative examples will be prepared in class. Comparability and evaluation of individual charts and maps in a series will be analyzed.

3-318. Machine Tabulation I

Fall, 2 credits. Repeated in Spring

MILTON KAUFMAN

Designed principally for statisticians, accountants, and operators of punch card tabulating equipment. The instruction covers the principles of operation, functions, applications, limitations, etc. of the various types of IBM equipment such as card punching and verifying machines (including types 24 and 26), sorters, alphabetic accounting machine (type 402), reproducing punches, and other auxiliary machines. *The course covers instruction in the basic wiring of the machines.* More than half the course is spent on the alphabetic accounting machine (type 402). Instruction also deals with the principal Remington Rand punch card tabulating equipment. The course is not intended to train personnel in the physical operation of the various machines.

3-319. Machine Tabulation II

Fall, 2 credits. Repeated in Spring

MILTON KAUFMAN

Designed principally for statisticians, accountants, operators, and supervisors of punch card tabulating equipment. The instruction covers the principles of operation and functions of the IBM accounting machines, type 407 and the collating machines, types 77 and 89. *The course covers instruction in the wiring of the machines including the solution of advanced wiring problems.* *Prerequisite:* Machine Tabulation I or knowledge of the basic wiring of tabulating equipment.

3-320. Introduction to Acceptance Sampling

Fall, 2 credits

EARL E. HOUSEMAN and RICHARD P. BARTLETT, JR.

A non-mathematical course in the planning, developing, and use of variables and attribute acceptance sampling plans. The instruction includes discussion of the role of the administrator and technician (other than the statistician) in planning, developing, and using sampling plans. Elementary probability; the binomial, Poisson, and normal distributions; sampling error; and tests of significance are discussed. Applications of statistical techniques are concerned mainly with those that can be easily used by non-statisticians.

3-380. Principles of Statistical Analysis

Year, 3 credits each semester

B. RALPH STAUBER

The purpose of the course is to lay a thorough foundation of the basic concepts and principles of statistical analysis, and to develop in the student an understanding of their application to scientific investigation. The course includes elementary probability; the binomial, Poisson, and normal distributions; introduction to sampling; statistical tests of significance; simple and multiple correlation; some theory of determinants with applications to correlation and the inverse matrix; introduction to analysis of variance and covariance; elementary principles of design and analysis of surveys and experiments; use of statistical tables by Fisher, Yates, and others. *Prerequisite:* A working knowledge of algebra, trigonometry, and analytic geometry; an elementary course in statistics is desirable.

3-385. Elements of Statistical Methods

Year, 2 credits each semester

WALTER R. HARVEY

A comprehensive study of the principles underlying statistical methods with particular reference to the natural and physical sciences; elementary probability, distribution of discontinuous and continuous variables, statistics versus parameters, the chi-square test, the "t" test, correlation, regression, analysis of variance and covariance, and the meaning of experimental error and statistical inference. This class meets at the Agricultural Research Center, Beltsville, Maryland. *Prerequisite:* College training in agriculture or a biological science. A college course in algebra will be helpful but is not essential.

3-400. Introduction to Mathematical Statistics

Year, 3 credits each semester (alternate years)

HARRY WEINGARTEN

A foundation course. A broad introduction to modern mathematical statistics, as preparation for further work in mathematical statistics for an advanced degree, or for a certified statement of accomplishment. Estimation: bias, consistency, efficiency. Testing statistical hypotheses. Solution of problems. Powers of various statistical tests. Use of moment generating functions to solve distribution problems. Methods of solution when the underlying distribution is unknown. Design of experiments and of sample surveys. *Prerequisite:* Calculus and Principles of Statistical Analysis or equivalent.

3-405. Introduction to Experimental Statistics

Year, 2 credits each semester

WALTER A. HENDRICKS

A non-mathematical course in the analysis and interpretation of data from agricultural and biological experiments. Elementary probability relationships; binomial, Poisson, and normal frequency distributions; the concept of sampling error; tests of significance of differences between averages; the chi-square test as applied to differences between observed and expected frequencies; regression and correlation; and elementary discussions of analysis of variance and covariance. Numerical examples. *Prerequisite:* College training in agriculture or a biological science; familiarity with ordinary methods of tabulating experimental data, computation of averages and the preparation of graphs.

3-408. Principles of Sample Design and Analysis

Year, 2 credits each semester

WALTER A. HENDRICKS

For students with a good working knowledge of statistical methods and elementary college mathematics who wish to become familiar with the design of sampling investigations, and the analysis of sample data, particularly in the field of agricultural surveys. Emphasis is on developing an understanding of principles of sample allocation, choice of sampling unit, computation of estimates of universe parameters from sample data, and the estimation of sampling errors and variance components. All important sample designs in current use (random, systematic, stratified, multistage, cluster) are discussed from that viewpoint. The background and interpretation of the basic formulas are developed through applications to numerical data. *Prerequisite:* Principles of Statistical Analysis, or its equivalent, and at least one year of college mathematics.

3-435. Sampling in Social and Economic Surveys

Fall, 3 credits (alternate years)

HAROLD NISSELSON

Non-mathematical survey of sampling theory and practice. Development of the basic ideas of statistical sampling, with applications in social and economic surveys. Unrestricted random, stratified, systematic, area and cluster sampling, and subsampling. Sample designs used in the United States and in foreign countries are discussed with respect to considerations of statistical efficiency, cost functions, and the administrative limitations imposed on the design. *Prerequisite:* A course in elementary statistics.

3-480. Statistical Methods and Experimental Design

Spring, 12 credits

JAMES G. OSBORNE and AUSTIN A. HASEL

Application of statistical methods to research work in the Forest Service, stressing the logic of experimentation and the techniques of design, analysis, and interpretation of experiments or surveys. Emphasis is placed on: testing hypotheses in forest research; distribution of sample statistics; tests of significance.

Registration limited to qualified research personnel of the Forest Service.

3-565. Data Processing on Electronic Computers I

Fall, 2 credits. Repeated in Spring

DOROTHY P. ARMSTRONG

BETTY S. MITCHELL

ELIZABETH T. NORTH

Provides a basic understanding of the capabilities and limitations of large-scale, high-speed electronic digital computers in general. Description of equipment presently available. The instruction code cited is that of the Univac system. Covers the following: types of computing equipment; organization of an electronic data processing system; notation and information units; machine functions; the Univac instruction code; logical flow charts; basic computer coding; coding techniques for standard operations; use of auxiliary equipment.

3-566. Data Processing on Electronic Computers II

Spring, 2 credits

DOROTHY P. ARMSTRONG

A continuation of Data Processing on Electronic Computers I for those who are interested in obtaining a more detailed knowledge of the preparation of computer programs. Emphasis on sorting, file maintenance, use of reference tapes, testing programs, preparation of test material, use of breakpoints, service routines, preparation of operating instructions, minimum latency coding, and automatic coding.

1-570. Design of Experiments in the Biological Sciences

(See p. 16)

3-735. Theory of Sample Surveys

Year, 2 credits each semester

JOSEPH STEINBERG

History of sampling in social surveys. The use of statistical control in improving the quality and efficiency of the estimates. Calculation of sampling errors. Random, stratified random, purposive, double and systematic sampling. Cost function, choice of sampling unit; size and type of sample necessary to attain a stated degree of precision, and the distinction between precision and accuracy. The theory of probability is developed as necessary. The contributions of Fisher, Neyman, Yates, Cochran, and others are studied. *Prerequisite:* Principles of Statistical Analysis and Calculus.

3-736. Non-sampling Errors in Statistical Surveys

Year, 2 credits each semester

LORING WOOD

Identification, measurement, and control of errors in the reporting, processing, and interpretation of statistical data. Studies of data source, re-enumerative surveys, record checks, studies of variation among results obtained by different enumeration or processing, and aggregate comparisons with independent data. Analysis of relationships between sampling and non-sampling errors and its bearing on the problem of obtaining the maximum of useful information per unit or cost. *Prerequisite:* Elementary Statistics, at least one advanced course in statistics, or professional experience in statistical work.

3-025. The Organization of Statistical Services within the Federal Government—Seminar

Fall, non-credit

WALTER F. RYAN

The Federal statistical system: its growth, organization, major characteristics, and functions. A series of four lecture-seminars meeting from 3:30 to 5:00 P.M. on October 2, October 16, October 30, and November 13. No registration is required; no fees are charged.

Office Techniques and Operations

DEPARTMENTAL COMMITTEE

HENRY A. DONOVAN (Chairman)

ROBERT H. FUCHS
KELSEY B. GARDNER
ZELMA J. HICKS
MARK M. KIRKHAM

JOHN S. LUCAS
WILLIAM L. MOORE (Vice-chairman)
MAX P. REID
EDMUND STEPHENS

The courses offered in this department are practical, how-to-do-it courses of interest chiefly to persons who are working with these procedures, or who hope to train themselves for such positions. They are helpful also to persons in positions requiring some familiarity with more than one of the procedures (e.g., supervisors and administrative assistants), and to persons at the higher levels of responsibility who wish to become acquainted with the details of the operations.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ADMINISTRATIVE PROCEDURES

The program leading to a Certified Statement of Accomplishment in Administrative Procedures should be of special interest to:

1. Persons already employed in administrative work of the procedural type, emphasizing techniques and skills.
2. Employees who aspire to enter administrative work.
3. Employees who wish to prepare to become administrative assistants or to head units concerned with administrative procedures.

Requirements

1. High school diploma or equivalent.
2. Sixteen semester hours of credit with grades of "C" or better in Graduate School courses, distributed as follows:
 - a. A course in American National Government.
 - b. A minimum of eight credits (in addition to *a* above) selected from courses above the 100 level in the Department of Office Techniques and Operations or the Department of Public Administration, or a combination of these. Courses in accounting may not be included, except Federal Fiscal Procedure and Federal Government Accounting.
 - c. The remaining credits may be selected from courses, not included above, in the Department of Office Techniques and Operations, excluding all shorthand courses.

- d. A course in elementary statistics may be included. It is not required. If it is included, three credits may be deducted from *c* above.



CLERICAL-ADMINISTRATIVE PROCEDURES

4-95. Office Aids and Basic Office Practices

Fall, non-credit

ZELMA J. HICKS
ENID C. GREEN

This course aims at developing in clerks, typists, and stenographers an understanding of good basic office procedures. Designed especially to acquaint them with reference aids, job planning and short cuts, telephone and office etiquette, correspondence styles, and some spelling and word usage. This course is intended for the newer employees.

4-101. Everyday Mathematics

Fall, 2 credits. Repeated in Spring and Summer

RALPH R. BOTTS
C. M. MOUSER

Designed for clerical workers who are called upon to apply fundamentals of arithmetic to their jobs. Emphasis is placed on review of business arithmetic, including fractions, decimals, ratios and percentages. Special applications are made to civil service and business problems such as bank, cash and trade discount, profit and loss, payrolls, simple and compound interest, fire insurance, stocks and bonds, property and income taxes, and the determination of interest rates charged on time purchases and small loans. Use of the calculating machine is explained.

3-100. Commercial Algebra

(See p. 37)

4-108. Administrative Procedure

Fall, 2 credits. Repeated in Spring and Summer

THOMAS J. HICKEY

Intended for persons who wish to become supervisors or administrative assistants or who are now serving in such capacity in a small organizational unit. Deals with the aspects of the day to day assignments for which these persons ordinarily are responsible, such as preparation of budget data for small organizational units; the proper establishment of authority and responsibility and organization structure; fundamentals of personnel administration; essential requirements for good supervision.

The second part of this course deals with the introduction to administrative planning, administrative procedures and management generally at the lowest organization level, including work reporting and work measurements, work processes and work control reports; relation of these studies to the budgetary and personnel needs of the unit; and the theory of staff versus operating jurisdiction over administrative planning.

4-201. Supervision

Fall, 2 credits. Repeated in Spring and Summer

MARK M. KIRKHAM

A course for persons who have or expect to have first-line supervisory responsibilities. Particular emphasis will be placed upon the need for understanding human behavior and attitudes as they manifest themselves in group efforts. The dynamic setting in which supervisory responsibilities are discharged, its importance to management, the individual qualities and specific techniques employed by supervisors to improve work methods will be considered, and a program of self-development and self-evaluation in the art of supervision suggested.

4-206. Essentials of Good Office Management

Fall, 3 credits. Repeated in Spring

GLENN D. WAGNER

Designed to give a better understanding of the principles and techniques of effective management and of the practical applications that can be made of these to one's work. Includes a review of current research and thinking in this field and a comparison of practices in government and industry. Covers such problems and questions relating to office management as (1) organizing for effective operations; (2) the planning and control of work; (3) utilization of office equipment and services; (4) paperwork management; (5) human relations problems; (6) getting coordinated effort and team work; and (7) effecting improvements.

4-112. Federal Fiscal Procedure

Fall, 2 credits. Repeated in Spring

LOUISE M. KRUEGER

This course is designed for persons who have no prior knowledge of Government fiscal procedures and who wish to enter the field of fiscal operations, and for those who wish to increase their knowledge in order to prepare themselves for more responsible positions. Covers the basic fiscal procedures, laws, regulations, and principles involved in the administrative examination of travel, transportation, procurement and other types of vouchers, the processing of payrolls, the handling of leave and retirement, the scheduling and coding of vouchers, and the handling of collections and claims. Case studies are used and applicable Comptroller General decisions in each area are interpreted.

4-113. Federal Property Procedure

Spring, 2 credits

WILLIAM J. GROSS
O. A. FULLER

An intensive one-semester course covering laws, regulations, and principles dealing with control, utilization, and disposal of Federal personal property. Designed to furnish persons currently employed in this field an opportunity to study approved accountability and control systems, including management techniques, capitalization policies, general ledger controls, audit and inspection requirements, inventory controls, and accountability methods; utilization policies and procedures, including development and application of use, replacement, and preventive maintenance standards; management through inventory controls, surveys, and inspections; disposal policies and procedures, including transfers, donations, sales, abandonment, and destruction; statistical reporting of motor vehicles.

4-114. Federal Personnel Procedure

Fall, 2 credits

HENRY C. STARNES

Deals with the elementary principles and procedures of Federal personnel administration, including a study of the Federal personnel structure and organization, history and progress of the merit system, rules and regulations of the Civil Service Commission, and other basic procedural sources; use of personnel forms and records; Civil Service examinations and recruitment; appointments; transfers; promotions; separations and reductions in force; suspensions and disciplinary actions; retirement; performance ratings; leave and hours of duty; personnel reports, applications of Decisions of the Comptroller General, administrative policy statements, and administrative orders.

4-115. Federal Purchasing Procedure

Fall, 2 credits

TONY M. BALDAUF

For persons who are in purchasing work or who wish to enter the field. Covers the historical and legal background of Federal purchasing, professional concepts in purchasing, current legal requirements, purchasing procedures from open market and Federal sources of supply, and purchasing techniques; the

practical application of such requirements through the preparation of purchase documents; the study of case problems involving legal or administrative restrictions or requiring the application of purchasing principles.

4-116. Federal Budgetary Procedure

Fall, 2 credits. Repeated in Spring

WILLIAM A. CARLSON

This course is designed for persons in budget work, up to and including Grade GS-9, or those interested in entering budget work. Students who are not in budget work will find it useful to have a general, although not necessarily a specialized familiarity with the concepts and terminology used in either fiscal, accounting, personnel, or financial operations in the Federal Government. The course covers procedures in (1) budget formulation, including the preparation of estimates, justifications, and supplementary materials; and (2) budget execution, including allotments, apportionments, and financial reports. Emphasis is placed on budget procedures at the bureau or small agency level. The case work includes the preparation of a budget estimate for a hypothetical government agency.

4-117. Records Management Procedure

Fall, 2 credits

DOROTHY M. LUTTRELL and ROBERT H. LANDO

A course of instruction in how to process, maintain and service records, designed for students who desire to enter the records management field or who are interested in supplementing their knowledge of the mechanics and techniques of record operations. Includes detailed instructions in methods of (1) recording and controlling communications, (2) classifying, coding and indexing correspondence and other record material, (3) filing records and references, and (4) furnishing records reference service, including the establishment and operation of charge-out and follow-up systems. This course also provides study and discussion of (1) the theory and structure of the various systems of classification and filing, (2) the selection of the proper systems of classification for individual requirements, and (3) the development of individual classification and filing patterns.

4-217. Advanced Records Management

Spring, 2 credits

DOROTHY M. LUTTRELL and ROBERT H. LANDO

An advanced course designed to give students a comprehensive knowledge of the management of Government records. The study of Federal laws and regulations governing the creation, maintenance, protection, preservation and disposition of records and action necessary for meeting these statutory and regulatory requirements including: (1) records management program activities; (2) planning and conducting records management surveys; (3) inventorying and evaluating records; (4) analyzing records management problems and formulating solutions to such problems by the application of management techniques to the organization and maintenance of current records and the disposition of non-current records; (5) the development and application of records retention and disposal standards; and (6) the appraisal, retirement, storage, microfilming and disposal of records. *Prerequisite:* Records Management Procedure or consent of instructor.

4-330. Government Letter Writing

Fall, 2 credits. Repeated in Spring and Summer

LUCILE N. BOYD
VERNE L. SAMSON

Intended for persons in administrative positions who are called upon to handle administrative problems through correspondence. The writing of clear, accurate, concise, courteous letters and memoranda. Principles of effective letter writing. Practice in criticizing and revising outgoing correspondence, and in

planning and drafting replies to incoming letters. *Prerequisite:* A good foundation in English grammar, vocabulary, and composition, through courses or writing experience.

4-421. Writing Procedures and Instructions

Spring, 2 credits

KAY PEARSON and ERNEST T. SPIEKERMAN

A course of instruction in how to develop and write manual issuances, circulars, office memoranda, and other forms of rules, regulations, instructions, and procedures. Special attention will be given to ways of improving readability of such material, the use of a clear, simple style of writing, proper format, and use of "ready-reference" aids. It will provide drill in the practical application of principles and theories of procedure to actual writing. The purpose of the course is to provide students with group experience in writing procedures and instructions and in applying editorial and format standards. *Prerequisite:* Management of Procedure and Correspondence Systems, or experience in writing procedures at Grade GS-5 or above.

SHORTHAND

The courses in shorthand at the Graduate School are designed to offer Federal employees a program of training for stenographic careers in the Federal service. Each course represents a separate unit of study, in which emphasis is placed on materials similar to those used in the Federal Government. The sequence of courses presents a sound foundation to qualify for the various grades of stenographers in the Federal service.

Review of Gregg Shorthand (Anniversary) serves as a rapid review course for the student who has not used his shorthand recently, or who needs additional practice in office dictation. The student who wishes to review Simplified Gregg should enroll in *Gregg Shorthand Simplified, 60-80 Words*.

In order to reach the goals stated in the course descriptions, home study is essential. The amount of study varies with the learning ability and requirements of the individual student.

The ability to type with a fair degree of accuracy and speed is a prerequisite for all shorthand courses.

Students who plan to take the Certified Professional Secretary (CPS) Examination will find the following courses helpful: Business Law, English for Secretaries—Rapid Review, Everyday Mathematics, Introduction to the Study of Human Relations, Office Aids and Basic Office Practices, Practical English Usage, Principles of Economics, and Supervision.

4-89. Review of Gregg Shorthand (Anniversary), 60-90 Words

Fall, non-credit. Repeated in Spring and Summer

FRANCES A. BUTLER
HARRIET E. STERN

A review of theory and brief forms. Reading from shorthand plates and students' own notes; dictation of standard material at various progressive rates of speed. *Prerequisite:* Completion of the Gregg Manual or its equivalent by the Anniversary system.

4-129. Gregg Shorthand Simplified I

Fall, 3 credits. Repeated in Spring and Summer

KATHRINE WILKEY GAASTERLAND
EVELYN J. ROBESON
EDITH WELTNER

Covers the theory of Gregg Shorthand Simplified. Beginning dictation on new and familiar material.

4-130. Gregg Shorthand Simplified II

Fall, 3 credits. Repeated in Spring and Summer

MARGARET O. HOBBS
KATHRINE WILKEY GAASTERLAND
EDITH WELTNER

Increasing mastery of principles of Gregg Shorthand Simplified, by review and drill. Minimum dictation speed of 60 words a minute attained, with accurate transcripts, on new standard material. *Prerequisite:* Gregg Shorthand I or equivalent.

4-225. Gregg Shorthand Simplified, 60-80 Words

Fall, 3 credits. Repeated in Spring and Summer

E. DONALD BELL

Theory review: brief forms; word beginnings and word endings; preliminary phrasing. Extensive dictation practice, using general business and governmental material. In-class and outside transcription. Sample Civil Service test material. Maximum dictation speed of 80 words a minute attained. *Prerequisite:* Shorthand I and II or equivalent theory and dictation courses, and a minimum speed of 60 words a minute on new, standard material.

4-226. Gregg Shorthand, 80-100 Words

Fall, 3 credits. Repeated in Spring

NORA M. WALKER
EDRIE C. WAY

For those who have a minimum dictation speed of 80 words a minute using either the Simplified or Anniversary system, and who are able to produce accurate transcripts of letters and reports. Students who are weak on theory should take either 4-89 or 4-225 before enrolling in this course.

Physical Sciences

DEPARTMENTAL COMMITTEE

HENRY STEVENS (Chairman)

MILDRED C. BENTON
ROBERT L. BOWMAN
ALBERT V. CARLIN
KENNETH C. COLMEN
JOSEPH HILSENATH

ELSA O. KEILES
ARNOLD J. LEHMAN (Vice-chairman)
JOHN LYMAN
LOUIS C. PELTIER
MAURICE J. TERMAN

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The courses in this department offer unusual opportunities for study under the guidance of scientists working in this field. The program will be of value to students who plan to enter these sciences; to those who desire to increase their knowledge of the science in which they now earn their living; and to those who wish, for cultural reasons, to learn more about these fields.

Most of the courses in this department are seminars designed to keep professional workers informed of recent developments in their fields and do not include laboratory work. A few of the courses offer basic training and, as stated in the course descriptions, include laboratory work.

In addition to the courses listed below, the Graduate School offers courses in the physical sciences at the National Institutes of Health in Bethesda. These courses are listed on pages 101-08 of this catalog.

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GENERAL

5-90. The Atom and Its Nucleus

Fall, non-credit

WILLIAM N. ELLIS

A lecture course, with suggested outside reading, on the development of atomic theory. It is used as an example of the application of scientific methods to unfold the secrets of nature. The application of a physical theory is exhibited in the development of the atomic bomb, nuclear reactors, and isotopic tracer techniques.

5-225. The Principles of Physical Science

Year, 2 credits each semester

MICHAEL J. PALLANSCH

A survey course designed for persons who work with scientific material but who may not have scientific training. It is of particular interest to librarians, information specialists, editors, research assistants, and others who have a general interest in current developments in the physical sciences. The fundamental concepts held in common in the fields of physics, chemistry, medicine, and cosmology are studied in relation to the recent developments in atomic power, space travel, synthetic fibers, antibiotics, human nutrition, and other subjects of current interest.

Although it is recommended that the two semesters be taken in sequence, each semester is taught as an independent unit, and students may enter the second semester without the first. In general, the topics in the first semester will be taken from the field of physics, and in the second semester from the field of chemistry.

CHEMISTRY

5-65. Review of Elementary Organic Chemistry

Summer, non-credit

C. S. PRICKETT

General survey and review of material usually covered in first course in organic chemistry. Emphasis is on reaction chemistry and practice with synthetic methods based on important reactions. *Prerequisite:* Course in organic chemistry.

5-315. Elementary Biochemistry

Year, 2 credits each semester

SIDNEY M. HESS

A comprehensive survey of the chemistry of body constituents and metabolic conversion. The first semester covers the chemistry of carbohydrates, fats, proteins, and the fundamentals of enzyme chemistry. The second semester deals with digestion and absorption of food, intermediary metabolism, and the physiological role of vitamins and hormones. *Prerequisite:* Organic chemistry.

5-349. Physical Chemistry (1957-58 and alternate years)

Year, 2 credits each semester

WILLIAM HORWITZ

Lecture course on the states of matter—gases, liquids, and solids; elementary thermodynamics, solutions, homogeneous and heterogeneous equilibria including the phase rule; ionic equilibria, conductance, electromotive force; chemical kinetics and colloids. *Prerequisite:* General chemistry, qualitative and quantitative analysis, physics, and calculus, or permission of the instructor.

5-400. Advanced Organic Chemistry (1957-58 and alternate years)

Spring, 3 credits

WILBUR I. PATTERSON

Emphasis on synthetic organic chemistry and determination structure. Discussion of reliable preparative procedures, including their scope and limitations. Brief review of classes of organic compounds, including an introduction to the chemical literature and nomenclature associated with the field. *Prerequisite:* Organic chemistry.

5-625. Specialized Analytical Techniques

Fall, 2 credits

GEOFFREY WOODARD and STAFF

A detailed discussion of some of the physical methods used in analytical work for determination, separation, or identification, particularly of organic compounds. Among the methods covered are ultraviolet, visible, and infrared spectrophotometry, partition, adsorption, and paper chromatography, and counter current distribution. Emphasis is placed on practical applications. Laboratory demonstrations are included where possible.

GEOGRAPHY AND GEOLOGY

Students who are studying or working in the field of geography or geology may be interested, in addition to the courses listed here, in courses in Soil Sciences, Meteorology, and Surveying and Mapping.

5-114. Maps and Charts

Fall, 2 credits (alternate years)

CATHERINE I. BAHN

An introductory course designed to give the analyst, researcher, librarian or teacher who works with maps an understanding of both domestic and foreign maps and charts, the agencies that produce them, their catalogs and indexes. Presents methods in reading and problems in interpreting foreign maps. United States, foreign and international mapping activities are studied on a workshop basis to permit presentation and solution of individual problems. All types of maps, charts, aids and reference materials are available for laboratory use.

5-203. General Geology

Fall, 3 credits

RAYMOND C. DOUGLASS

Minerals and rocks as constituents of the earth's crust; processes of weathering, erosion and deposition; vulcanism; structures of sedimentary and igneous rock formations; diastrophism; mountain building; land forms and their relation to various geologic processes; stability of the earth's crust. The course includes classroom exercises in the study of common minerals and rocks, and interpretation of topographic and geologic maps. *Prerequisite:* Inorganic chemistry is desirable.

5-205. Practical Geology

Spring, 3 credits

RAYMOND C. DOUGLASS

A non-professional course describing the practical uses and economic aspects of geology. General background of historical and regional geology; brief analysis and comparison of exploratory methods; summaries of origins, occurrences, and distribution of ground water, petroleum, non-metallic and metallic mineral deposits; and a survey of the applications of geology to civil engineering. Assignments are made to familiarize the student with the utilization of geologic methods in each of these fields. *Prerequisite:* A knowledge of elementary physical geology or some familiarity with minerals and rocks is desired.

5-455. Photogeology

Fall, 3 credits

WILLIAM R. HEMPHILL

Interpretation of various geologic terranes from aerial photographs, stressing recognition criteria of geologic data and final geologic interpretations based on these data. Lectures supplemented by seminar-type discussions of recent literature. *Prerequisite:* Physical geology and geomorphology. Structural geology is desirable.

[5-533.] Hydrology (1958-59 and alternate years)

Year, 3 credits each semester

TOR NORDENSON

A two-semester course in basic and applied hydrology at the professional level. The first semester will be largely descriptive, covering such topics as elementary hydraulics; measurement and interpretation of streamflow, precipitation and other basic data; the hydrologic cycle; physics of soil moisture; the infiltration theory; wave travel and the unit hydrograph. The second semester will cover the development and application of procedures for applying basic hydrology to practical problems of river forecasting and design of water control works including such subjects as streamflow routing, flood frequency, the rational method of estimating flood magnitude, hydrometeorology, forecasting of runoff, influence of water control structures on streamflow, and problems of water control operation. *Prerequisite:* Physics and algebra; elementary meteorology, statistics, and engineering desirable.

SOIL SCIENCES

[5-405.] Soils—Their Origin and Geography (1958-59 and alternate years)

Spring, 3 credits

CONSTANTIN C. NIKIFOROFF

A descriptive course covering the basic principles of the origin of the soil as a function of the environment and the pattern of distribution of various soils throughout the world. The role of soil formation in broad geochemical and geophysical cycles and the geographical factors of soil formation such as climate, relief, and biological pressure are first discussed in non-technical terms, followed by several lectures dealing with the physical nature of soil and the geographical analysis of the soil pattern of various parts of the world. The dynamic nature of soils and relationships between soils, climate and vegetation are emphasized throughout the course. *Prerequisite:* Freshman chemistry or its equivalent. Previous training in plant ecology, physical geography, and climatology is desirable.

5-531. Soils: Their Morphology, Genesis, and Classification (1957-58 and alternate years)

Spring, 3 credits

CONSTANTIN C. NIKIFOROFF

The nature of soils and the broad principles governing their behavior are first discussed, followed by consideration of soil morphology, formation, and classification. Particular attention is given to characteristics of the great soil groups and their genesis in relationship to the physical and biological forces of the environment. Soil geography of the United States is dealt with broadly, but some examples from other parts of the world are used. Throughout the course, relationships of soil characteristics to agricultural development, soil use and conservation, and patterns of human occupancy are emphasized. *Prerequisite:* Freshman chemistry or its equivalent. Previous training in soils, plant physiology, geography or geology is desirable.

METEOROLOGY

The following courses in meteorology are offered in cooperation with the United States Weather Bureau. The courses may be taken singly, or as a program leading to a certificate of accomplishment. Registration in these courses is not limited to employees of the Weather Bureau.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN METEOROLOGY

Two Certified Statements of Accomplishment are offered in meteorology. The required programs are outlined below. The First Certified Statement of Accomplishment in Meteorology may be awarded to the student who satisfactorily completes the required courses totaling 19 credits. The Second Certified Statement of Accomplishment in Meteorology may be awarded to the student who completes the courses totalling 34 credits.

The required courses, Calculus and College Physics, are considered to be the absolute minimum in mathematics and physics. A more complete preparation, and the one recommended to the per-

son who wishes to make meteorology his professional career, will require courses also in differential equations and vector analysis. Courses in chemistry and statistics would be valuable, but not essential.

COURSES LEADING TO CERTIFIED STATEMENT OF ACCOMPLISHMENT IN METEOROLOGY

First Statement—Elementary

Required Prerequisite Courses:

Calculus

College Physics

Required Meteorology Courses:

General Meteorology (3)

Introduction to Dynamic Meteorology (6)

Synoptic Meteorology (6)

Weather Analysis and Forecasting (4)

Second Statement—Advanced

Courses required for the first statement plus the following:

Advanced Weather Analysis and Forecasting (6)

Electives (9 credits) selected from the following courses:

Elements of Fluid Mechanics
(6)

Principles of Statistical Analysis (6)

Tropical Meteorology (3)

Applied Climatology (3)

General Oceanography (2)

Marine Meteorology (2)

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5-162. Meteorology for the Non-professional

Fall, 2 credits

ALBERT V. CARLIN

This is a course for people interested in knowing what is behind the weather, why weather changes, and what goes on in the atmosphere around them. The course is designed particularly for administrative, clerical, and secretarial people who work with professional meteorologists, to learn the meanings of the words and terms in meteorology with which they come in daily contact, and for non-meteorologists who have a layman's interest in the weather.

5-326. General Meteorology

Spring, 3 credits

SIGMUND FRITZ

A one-semester course in the fundamentals of the physical aspects of modern meteorology for the professionally interested student. Atmospheric composition and structure and their measurements; solar and terrestrial radiation, radiation laws; gas laws; adiabatic, pseudoadiabatic, and non-adiabatic processes; fronts; thunderstorms; fog; wind. *Prerequisite:* Two years of high school algebra and trigonometry.

5-328. Statistical Meteorology

Fall, 3 credits

WILLIAM H. KLEIN

The application of modern statistical methods to synoptic meteorology and climatology. This course is intended primarily for the student of meteorology and the professional meteorologist who are unfamiliar with statistics. Emphasis is placed on the understanding and use of statistical theory in the solution

of applied problems. Topics include: frequency, variability, sampling, probability, regression, correlation, significance, time series, statistical forecasting, and forecast verification. *Prerequisite:* College algebra and elementary meteorology.

5-330. Agricultural Meteorology

Fall, 3 credits

JAMES M. BEALL and DONALD P. SPRINGER

An introductory course in the application of meteorology and climatology to operational problems in agriculture. Topics will include: micrometeorology applied to agriculture, a study of heat and water budgets in the plant zone of soil and atmosphere, elementary soil physics, and meteorology of enclosed spaces; agricultural climatology and microclimatology; effects of weather on agricultural production, including economic effects and physical effects on plants, animals, insects, and plant diseases; and weather services for agriculture, including specialized synoptic forecasts, utilization of climatological data, and instrumentation for agricultural observations. *Prerequisite:* Introductory meteorology, algebra, and trigonometry, or the consent of the instructors.

5-415. Applied Climatology

Fall, 3 credits

WOODROW C. JACOBS

The application of well known climatological methods toward solving specific weather problems of business, industry, air and surface transportation, and agriculture. Emphasis is placed on application of climatological methods in the solution of applied problems. The case method of class presentation is employed throughout the course. *Prerequisite:* A knowledge of the basic principles of meteorology.

5-534. Introduction to Dynamic Meteorology

Year, 3 credits each semester

ALBERT V. CARLIN
MORRIS TEPPER

An introductory course consisting of the application of the general principles of mechanics, thermodynamics, and fluid motions to the study of the atmosphere and its movements. *Prerequisite:* College physics, and mathematics through differential and integral calculus.

5-535. Elements of Fluid Mechanics

Year, 3 credits each semester

MORRIS TEPPER

A basic one year course in the foundation of fluid mechanics aimed at giving the student a physical feeling for the more important concepts and relationships involved in problems concerning the flow of fluids. Topics will include: Flow models, basic concepts such as density, pressure, vorticity, viscosity, capillarity, etc., conservation laws, Bernoulli's equation, dimensional reasoning, characteristic parameters such as Froude number, Reynolds number and Mach number, potential flow, surface waves, elements of viscous flow and an introduction to compressible flows. *Prerequisite:* College physics and mathematics through differential and integral calculus.

5-536. Synoptic Meteorology

Year, 3 credits each semester

JAY S. WINSTON

Description and explanation of circulation and weather processes observed in the atmosphere, with emphasis on forecasting applications. First semester: air motion, three-dimensional structure of pressure and wind systems, cyclones, anticyclones, fronts, air masses, and prognosis of circulation patterns. Second semester: temperature forecasting, clouds and precipitation, fog and other visibility phenomena, thunderstorms, squall lines, tornadoes, turbulence, icing, sea breeze, and mountain and valley winds. *Prerequisite:* General Meteorology, college physics and calculus, or the consent of the instructor.

5-538. Weather Analysis and Forecasting (1957-58 and alternate years)

Year, 2 credits each semester

JAY S. WINSTON and THOMAS I. GRAY, JR.

A laboratory course in which concepts of air masses, fronts, and mid-tropospheric flow patterns are applied to analysis and prognosis of sea level and upper air weather charts for North American and adjacent areas. Short range forecasts of various weather elements are prepared for local and regional areas of the United States. *Prerequisite:* Synoptic Meteorology or equivalent.

[5-580.] Advanced Weather Analysis and Forecasting (1958-59 and alternate years)

Year, 3 credits each semester

JAY S. WINSTON and THOMAS I. GRAY, JR.

Treatment of many techniques and concepts that are of importance in present-day forecasting, including some of the more advanced developments. First semester: hemispheric synoptic map analysis, predicting motion and development of waves in the westerlies, numerical weather prediction, large-scale vertical motion and divergence, isentropic analysis, and the jet stream. Second semester: extended-range forecasting, statistical prediction methods, and forecasting tornadoes and severe thunderstorms. Lectures and laboratory. *Prerequisite:* Synoptic Meteorology, Weather Analysis and Forecasting, Dynamic Meteorology, or the equivalent.

5-589. Tropical Meteorology

Spring, 3 credits

LESTER F. HUBERT

Survey of major features of tropical climatology. Convection. Dynamics and kinematics of the tropics. Synoptic models. Hurricanes and typhoons. Forecasting, including hurricane path computation. Includes map analysis and laboratory work, in which streamline-isotach analysis is emphasized. *Prerequisite:* 20 hours of meteorology or the equivalent in experience, and calculus.

OCEANOGRAPHY

5-360. General Oceanography

Fall, 2 credits

RICHARD C. VETTER

A descriptive lecture course covering the characteristics of the oceans and the factors that control the distribution of properties and of plants and animals. Includes the physics, chemistry, geology and biology of the oceans. *Prerequisite:* College courses in at least two of the physical or biological sciences.

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Certified Statement of Accomplishment in Oceanography

A program leading toward a Certified Statement of Accomplishment in Oceanography has been established in cooperation with the U. S. Navy Hydrographic Office. The courses are taught in Suitland, Maryland, and are open to anyone who can meet the designated prerequisites.

The requirements for the certified statement are twenty hours of credit distributed as follows:

- (1) The following required courses: (Equivalent courses taken elsewhere may be substituted.)
 - Physical Properties of Sea Water (2)
 - Mathematics for Oceanographers (2)
 - Geological Oceanography (2)
 - Biological Oceanography (2)
- (2) At least six hours of credit selected from the following courses:
 - Practical Electronics for Oceanographers (2)
 - Ocean Surface Waves (2)
 - Dynamic Oceanography (2)
 - Marine Meteorology (2)
- (3) The remaining six hours of credit may be selected from courses offered by the Graduate School in fields related to oceanography, such as chemistry, physics, geology, geography, mathematics, engineering, meteorology, and biology. These electives should be selected by the student in consultation with the Registrar.

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5-582. Mathematics for Oceanographers

Spring, 2 credits (alternate years)

LLOYD SIMPSON

An integrated course in college algebra, trigonometry, analytic geometry, and calculus with emphasis on these topics as they apply to problems in oceanography.

5-584. Physical Properties of Sea Water

Spring, 2 credits (alternate years)

A. WAYNE MAGNITZKY

A detailed examination of the physical principles governing the properties of sea water; a comparison of these properties with those of pure water; the definition and calculation of salinity and density; distribution of salinity, temperature, and density.

5-585. Practical Electronics for Oceanographers

Spring, 2 credits (alternate years)

ROBERT L. BROCK

Basic principles of electronic theory and elementary circuitry. Composition of various instrument components are demonstrated, with emphasis on methods of combining the components for specific instrumentation. Practical demonstrations and laboratory work.

5-655. Ocean Surface Waves

Spring, 2 credits (alternate years)

J. J. SCHULE, JR.

The measurable properties of ocean surface waves and the methods of observing and analyzing ocean waves. The wave solution to the hydrodynamic equations is demonstrated. Discussion of the various sea surface models including their assumptions, solutions, and practical applications; the problems of propagation of waves in a dispersive medium. Examples of the various forecasting techniques. *Prerequisite:* Calculus, or Mathematics for Oceanographers.

[5-658.] Geological Oceanography (1958-59 and alternate years)

Fall, 2 credits

C. C. BATES

The topography and the composition of the ocean floor and coastal features, and the underlying causes. Emphasis is placed on dynamic processes and the deductive reasoning required to understand ocean features now being extensively observed with modern instrumentation. *Prerequisite:* Professional knowledge of oceanography or geology.

5-662. Marine Meteorology (1957-58 and alternate years)

Fall, 2 credits

M. D. BURKHART

An introduction to the fundamental principles of marine meteorology with special emphasis upon the problems of the marine climatologist and the physical oceanographer. Topics include: descriptive and synoptic meteorology; air mass analysis; boundary processes; radiation; and climatic principles. *Prerequisite:* Professional knowledge of meteorology or oceanography.

5-664. Dynamic Oceanography (1957-58 and alternate years)

Fall, 2 credits

J. J. SCHULE, JR.

A short exposition of the principles of vector analysis precedes the main course topics. These include the development of the principles of conservation of mass and momentum; the vector equations of motion; the hydrostatic equations and the density-pressure-depth relationship; the various current equations; the principles of turbulence; the equation of mean motion; and various approaches to the problem of evaluating the eddy stress terms. *Prerequisite:* Physical Properties of Sea Water, and Mathematics for Oceanographers or its equivalent.

5-666. Biological Oceanography (1957-58 and alternate years)

Spring, 2 credits

BYRON B. BAKER

Identification and descriptive analysis of the more important flora and fauna; detailed examination of the physico-chemical principles of the nutrient and carbon-dioxide systems; distribution of flora and fauna. *Prerequisite:* Professional knowledge of oceanography or biology.

Public Administration

DEPARTMENTAL COMMITTEE

JOHN H. THURSTON (Chairman)

GLADYS L. BAKER
TONY M. BALDAUF
JAMES L. BUCKLEY
K. A. BUTLER
JOHN C. COOPER
THOMAS J. FLAVIN
CLARE HENDEE

HENRY G. HERRELL
G. E. HILBERT
MARTIN KRIESBERG
JOSEPH P. LOFTUS
WILLIAM A. MINOR
ROSS POLLOCK
JOHN L. WELLS

This program offers a general understanding of American government and the fundamentals of public administration. In appreciation of a sense of history in administration, it includes two basic courses in American history. A student who plans to take work in any of the other divisions of the department will find that the specialized courses are more meaningful and useful if he has first completed the general courses in this division.

CERTIFIED STATEMENTS OF ACCOMPLISHMENT IN PUBLIC ADMINISTRATION

COMMITTEE

GLADYS L. BAKER (Chairman)
PATTERSON FRENCH JOHN H. THURSTON

Certified Statements of Accomplishment in Public Administration are granted to undergraduate and advanced students who complete an organized course of study in public administration intended to provide basic training for responsible administrative work.

Certified Statement of Accomplishment—Undergraduate

The program leading to the undergraduate certificate should be of special interest to:

1. Administrative assistants who wish to prepare for more responsible administrative positions.
2. Management Interns. Those who entered the service with a management option may profit from courses both more advanced and more specialized than those taken in college. Those who entered on various professional options and are now employed in such professions can profit very greatly from these courses if they expect, or wish to prepare, to enter into administrative work connected with their professional fields.

3. Persons in non-administrative specialties who expect to take on administrative duties or who wish to enter into administrative work.
4. Persons in technical fields who wish to broaden their understanding of government administration.

Requirements (44 hours of credit)

Students seeking this statement should consult with the Registrar and obtain approval of their proposed course of study early in their academic program.

1. High school diploma or equivalent. Applicants for the certificate must file a transcript of their high school or college work before completion of their certificate program.
2. Twenty semester hours of credit with grades of "C" or better in college level courses in the social sciences.

Much importance is attached to general background courses in the belief that they help to broaden the thinking and understanding of the student so that he will possess a wider range of ideas and interests and sounder judgment of social values than would otherwise be the case and in consequence will be able to render government service of a higher level of value. For this reason, these requirements will not be waived.

The following courses must be taken:

American or European Government, or Political Science
Principles of Economics
American or European History
Survey of Public Administration

With the approval of the Registrar, credit may be given for not more than six hours of courses other than in social science that are considered to be of value in connection with work in public administration (such as writing, public speaking, statistics, accounting, or subject-matter courses related to the work of the agency in which the student is employed).

Equivalent courses will be accepted from other institutions to meet this requirement of general background courses.

3. Twenty-four semester hours of credit with grades of "C" or better in undergraduate and graduate courses in public administration, excluding all accounting courses except Internal Auditing. The twenty-four credit hours are to be distributed as follows:

- a. A minimum of six credits from the Division of Organization and Management.
- b. The remaining eighteen credits may be selected from the Divisions of General Administration, Financial and Budgetary Administration, Legal Administration, Procurement and Property Management, or additional courses in Organization and Management. Students are advised to include in their programs at least one course from each Division.
- c. Upon prior approval of the Registrar, credit for courses outside the Department of Public Administration (including not more than two courses in office techniques and operations) may be applied when such courses are properly in line with the student's major interest.
- d. When the student has completed the social science requirements and fifteen hours in public administration, he should review his course of study with the Registrar.

Certified Statement of Accomplishment in Management—Advanced

This certificate is granted to students who complete an organized course of study intended to provide advanced training in management. The program should be of interest not only to persons who are responsible for management of operating programs, but also to those in specialized fields of management who wish to add perspective to their work, to persons who wish to prepare for more responsible administrative positions, and to scientific, technical, and professional people who have or expect to have administrative responsibilities. The requirements have been established with the aim of assuring the students a broad coverage of the major areas of administration.

Requirements (20 hours of credit)

Students seeking this certificate should consult with the Registrar and obtain approval of their proposed course of study early in their academic program.

1. Government experience at the level of GS-9 or above, or a Bachelor's degree, or a Certified Statement of Accomplishment in Public Administration.
2. Twenty semester hours with grades of "B" or better in courses distributed as follows:
 - a. A minimum of fifteen semester hours selected from the following:

- Budgetary and Financial Administration (2)
- Contemporary Trends in Public Administration (3)
- Human Relations in Administration (3)
- Organizing and Administering a Personnel Development Program (3)
- Principles of Scientific Management (3)
- Readings and Papers in Public Administration (3) or (6)
- Techniques of Organization (3)
- b. The remaining semester hours shall be selected from courses numbered 500 or above in public administration or, with the approval of the Registrar, in other social sciences.
- c. When a student has completed twelve hours in public administration courses, he should notify the Registrar so that he may be assigned to an advisor.

Certified Statements of Accomplishment with Honors

Students who complete the requirements for the Certified Statement of Accomplishment in Public Administration (undergraduate) or the Certified Statement in Management (advanced) with an average of "B" or higher may qualify for honors by passing an oral examination. The examination is given by a panel set up by the Graduate School. Students who wish to take the examination should apply to the Registrar at the completion of their programs.

GENERAL ADMINISTRATION

COMMITTEE

MARTIN KRIESBERG (Chairman)

GLADYS L. BAKER

A. J. NICHOLS

These courses offer a general understanding of American government and the fundamentals of public administration. In them a special emphasis is placed on the relationships of citizens and public employees.

A student who plans to take work in any of the divisions of the department will find that the specialized courses are more meaningful and useful if he has first completed the basic courses in this Division.

6-341. American National Government

Fall, 2 credits. Repeated in Spring

MARTIN KRIESBERG
SALVATORE NERBOSO

History and origins of the national Government of the United States; the political process—parties and elections; the legislative process; the functions of

the national Government and their administration; courts and judicial review of legislation.

6-344. Survey of Public Administration

Fall, 3 credits

CARL F. STOVER

This is a survey course designed to introduce the student to the elements of public administration and to lay a foundation for further study and practice in the field. Topics considered are: the evolution of administrative organization; organizational types: staff, line, and auxiliary agencies and functions; controls of administration; the broadest aspects of personnel selection, classification, training, movement, and relations; budgeting and fiscal control; federal-state relations; administrative legislation and adjudication.

6-346. Conference Methods Workshop

Fall, 2 credits. Repeated in Spring

L. K. WRIGHT and C. O. HENDERSON

Designed for persons who desire to prepare for leadership responsibilities in planning, conducting, or participating in meetings of any kind, and especially those of an official nature. The class is conducted by means of demonstration, lecture, participation in practice meetings, analysis, and evaluation. Topics include types of meetings, agenda, arrangements, use of visual aids, order of business, chairmanship, committees, fundamental parliamentary procedure, guiding principles, objectives, organizing and presenting reports, introductions, reaching decisions, and summarizing.

6-400. Administrative Operations for Congressional Assistants

Spring, 2 credits

JEROME N. ELLER

This course deals with the practical administrative problems encountered by secretaries and other staff assistants to U. S. Senators and Congressmen. Such matters as the following are considered: organization of office routine; preparation and distribution of newsletters and publicity releases; special services available to members of Congress; the use of Senate and House Documents and reports; relations with the Executive departments; pressure groups; relations with constituents; the practical workings of Congress; assistance with legislative matters.

6-402. Public Administration in a Democracy

Fall, 2 credits

MARTIN KRIESBERG

This course will cover: (1) the process of administrative policy making, including the influence of democratic values and traditions, Congress and its members, organized groups and institutions, politics and political parties, and organs of public opinion; (2) organizing for democratic administration, including organizational structures, recruiting, security, and financing and measures for efficiency and economy; and (3) the process of carrying out policies, including gauging public opinion, the use of advisory committees, decentralization of administration, and public relations and information programs.

6-453. Human Relations in Administration

Fall, 3 credits

E. GRANT YOUMANS

Designed to develop the student's understanding of and insight into interpersonal relationships in large-scale organizations. Includes: value orientations in administration; formal and informal organization; pathologies in administration; status and role; power and authority; styles of leadership; authoritarian and democratic administrators; career dynamics; psychological stress in administration; motivation and morale.

6-454. Applied Human Relations in Administration

Spring, 2 credits

E. GRANT YOUMANS

A laboratory course designed to give students practice in applying principles of human relations in administration. Includes: diagnoses of social processes in administration; skills of effective performance in face-to-face situations; formulation and assignment of administrative objectives; creating appropriate social climate; leadership skills; utilizing member resources; irrational factors in administration; decision-making processes. *Prerequisite:* Course 6-453 or consent of instructor.

6-459. Tools and Techniques of Creative Staffwork

Fall, 2 credits

TRUMAN G. BENEDICT

Reviews principles, philosophy, and methods, especially graphic methods, of solving major managerial problems through creative staffwork. The aim of the course is to aid students in devising and applying the requisite tools and methods for bringing about integrated solutions to significant managerial problems, from a staff position.

The teaching will be illustrated with materials demonstrating the application of validated staff methods to problems of organization design, evolution of staffing policy and patterns, and design of military and civilian career programs in a large military agency. Students will have opportunity to practice devising and applying methods for the solution of managerial problems of their own choosing, with constructive aid and criticism.

This course is suitable for persons in, or planning to work in, any of the staff areas, such as finance, management, personnel, and organization and methods; for those who supervise such staffs; and for managers who depend upon creative staff work for reliable assistance in the solution of managerial problems.

6-587. Contemporary Trends in Public Administration

Spring, 3 credits

CARL F. STOVER

This course is designed for the person who has had some experience or training in administration. It gives attention to important areas in the analysis of governmental administration, such as the development of a theory of organization, policy and administration, decision-making, executive leadership, and the application of scientific analysis to administrative problems. The objects of the course are to deepen the student's insight into administrative operations, to broaden his understanding of administration in a democratic society, and to introduce him to materials in new areas of inquiry. The course is taught primarily through the intensive discussion and analysis of readings, drawn from the writings of such persons as Chester I. Barnard, Alex Bavelas, Leon Festinger, Harold Lasswell, Alexander Leighton, Kurt Lewin, Wayne A. R. Leys, Karl Mannheim, Robert Merton, C. Wright Mills, David Reisman, Philip Selznick, Herbert Simon, Harold Stein, and Max Weber. Registration is subject to the approval of the instructor.

6-600. Readings and Papers in Public Administration

Fall, 3 credits. Repeated in Spring

JOHN H. THURSTON, Coordinator

Under the guidance of a senior administrative official, supervised readings with monthly conferences on specified topics of administration or individual research and a paper on some problem or phase of administration. Readings or problem to be investigated are determined in consultation with adviser. *Prerequisite:* Completion of all other requirements for the undergraduate or graduate certified statement of accomplishment in public administration. The course may be taken, with the approval of the coordinator of the course, by students who are not candidates for certified statements if they have the equivalent background in public administration.

2-420. Communications Review for Executives (See p. 26)

AMERICAN HISTORY

6-250. American History to 1865

Fall, 3 credits

WAYNE D. RASMUSSEN

A survey of the political, social, economic, and cultural forces, prior to 1865, that have contributed to the development of American civilization. Includes a summary of the colonial period; the political, economic, and diplomatic factors of the American Revolution; and the development of national life and institutions.

6-251. American History since 1865

Spring, 3 credits

WAYNE D. RASMUSSEN

A survey of the political, social, economic, and cultural forces that, since 1865, have contributed to the development of present-day American civilization. Includes the frontier movement and immigration; constitutional growth and changes in world relations; and economic change and development.

ORGANIZATION AND MANAGEMENT

COMMITTEE

JOSEPH P. LOFTUS (Chairman)

MANLIO F. DE ANGELIS
N. ROBERT BEAR
EDMUND D. DWYER

ARTHUR B. JEBENS
MARK M. KIRKHAM
HAROLD A. STONE

JAMES H. STOVER

These courses are offered to give students an opportunity for progressive study and advancement in the general field of organization and management. The courses use to advantage, among other background data, the instructional and case materials developed by the Bureau of the Budget and by other Governmental agencies.

6-405. Principles and Techniques of Management Analysis

Year, 2 credits each semester

RICHARD F. COOK

Deals with the principles and techniques employed in surveying and analyzing organization and methods problems and in formulating solutions to such problems. Emphasis on planning and conducting procedures surveys; methods and approaches in analyzing and planning organization structures including analysis of the impact of individual and group behavior on formal organization structures and authority; methods of dividing work (production planning) and controlling work (production control); relationship of the scientific method to O and M work; analysis of staff and line concepts and relationships including the problem of overcoming resistance to new methods and procedures. *Prerequisite:* Experience in O&M work.

6-410. Management of Procedures and Correspondence Systems

Fall, 2 credits

Instructor to be announced

A survey of the purposes, objectives, and problems of managing formal, internal communications systems, and an intensive study of systems for the orderly dissemination of official written material. Emphasis is on planning, de-

veloping, installing, operating, analyzing, and evaluating such systems, and their contribution to agency management and operation. The course includes subjects previously covered by courses on directives systems and correspondence management.

6-412. Reports and Forms Management

Fall, 2 credits. Repeated in Spring EDWARD J. LEWIS and WILLIAM B. RICE

Designed to provide students with a comprehensive knowledge of forms and reports management systems and how to operate them. A study of: various systems used for controlling forms and reports; different techniques used in Government for forms design and format; standards and printing specifications; methods for analyzing forms and reports; and how to install and operate forms and reports management programs. Analysis of forms and reports by case studies with group discussion of techniques involved. Special lectures by top technicians from representative Government departments.

6-450. Principles of Scientific Management

Fall, 3 credits

JOSEPH P. LOFTUS

Presentation affords a review of principles fundamental to management activities. The scientific management approach is emphasized in historical perspective: its origin, development, and present status. Implications of scientific management on-the-job and in the administration of Federal agencies are discussed. Staff services and functions are related to management planning, standards, controls, surveys, and reports. *Prerequisite:* Bachelor's degree or satisfactory completion of courses in management analysis or public administration.

6-519. Work Standards and Work Measurement

Fall, 2 credits. Repeated in Spring

WILFRED S. WILLIAMS and SIDNEY SCHNEIDER

A study of the most advanced techniques of scientific management concerned with development of work standards and measurement of work loads and performance, and of their adaptability in public administration. Statistical and experimental methods of determining standards. Dangers to avoid in setting standards. Time study. Standards as a dynamic part of operations, and a tool in developing policies on personnel placement and training. Standards as aids in developing budgets, in planning operations, and in individual work planning. Relationship of standards of performance to those of costs and quality. Importance of dependable standards, measurement and appraisal of performance to summary statements of progress for the use of higher administrative officials. *Prerequisite:* Practical working experience at Grade GS-7 or above, or permission of instructors.

6-550. Techniques of Organization

Spring, 3 credits

DAVID D. LEVINE

Organization of public and private agencies. Brief historical review of organization, including church, military, and modern industry. The division of work. Delegating responsibility. Span of control and unity of command. The staff assistant and staff specialist. Group decision-making. Decentralization and the problems of coordination when geographically dispersed. Process of reorganization including timing, developing and putting into effect. The organization chart and manual. Case studies. *Prerequisite:* A course in public administration, scientific management, or O&M analysis.

FINANCIAL AND BUDGETARY ADMINISTRATION

COMMITTEE

JOHN L. WELLS (Chairman)

CHARLES L. GRANT
FRED A. McNAMARADAVID H. SPANIER
FRANK H. SPENCER

Students desiring a knowledge of how the Government obtains, budgets and manages its money will find helpful some of the courses in general administration as well as the specialized courses in this division. Those with limited experience in this field should begin their study with Federal Budgetary Procedure in the Division of Office Techniques and Operations, and the general administration courses before attempting the advanced course in Budgetary Administration.

The course in hospital administration is designed for persons who are engaged in hospital or health administration in either private or government agencies.

6-525. Financial Organization and Procedures of the Federal Government (1957-58 and alternate years)

Fall, 2 credits

CARL W. TILLER

A comprehensive summary presentation of Federal fiscal administration, presented primarily on a lecture basis, and including review of the roles of major participants: Treasury, GAO, Congressional Committees, Bureau of the Budget, and operating departments. Designed to provide an understanding of the financial organization and procedure of the Federal Government, including its fund and account structure, methods of financial control, the use of financial reports, and related subjects. An orientation course for persons working in some part of the area of financial administration, such as budgeting or accounting, and for general or program administrators who wish an overall picture of the financial structure of the Government.

6-635. Budgetary and Financial Administration

Fall, 2 credits

CHARLES L. GRANT

This is an advanced, one-semester course for experienced budget and administrative personnel. Covers the broad phases of budgetary and financial administration in the Federal Government primarily from the standpoint of the operating departments. Emphasizes the role of budget formulation and execution in the relationships between the legislative and executive branches of the Government and among the staff operating agencies within the executive branch. The first half of the course deals with the pre-appropriation phases of budgeting, including formulation, review, and congressional enactment of the budget. Topics discussed include: the role of budgeting in program formulation; the role of bureaus, departments, Bureau of the Budget, the President and Congress in budgeting; content of the budget and of departmental estimates and related budgetary materials. The second half of the course deals with the execution of the budget after it is enacted by Congress and the relationships of administrative planning and control, accounting, auditing, and financial reporting to budget execution. *Prerequisite:* Bachelor's degree and an introductory course in public administration; or experience at a responsible level in budgetary, financial or general administration; or consent of instructor.

6-360. Hospital Business Administration I: Accounting, Statistics, and Finance

Fall, 2 credits

DAVID H. SPANIER

Principles of hospital fund accounting; general fund income, expense and balance sheet accounts; temporary and endowment fund accounts; plant fund accounts. Adjusting and closing entries; prepaid and deferred items; preparation of trial balances. Hospital patient and hospital service statistics. Hospital financial and statistical statements. Cash receipts and accounts receivable procedures. Cash disbursements and accounts payable procedures. Inventories. Credits and collections. Payroll and personnel procedures. Check lists of equipment and supplies; depreciation; reserves. Geared especially to operations of Government hospitals. *Prerequisite:* Principles of Accounting, or the equivalent in experience.

6-361. Hospital Business Administration II: Cost Analysis Methods and Budgeting

Spring, 2 credits

DAVID H. SPANIER

Principles of hospital cost analysis methods, rate structures and budgeting. Detailed cost analysis problems, organization of accounting department, principles of internal control and food cost accounting. Geared especially to operations of Government hospitals. *Prerequisite:* Hospital Business Administration I, or its equivalent in experience.

6-461. Hospital Administration

Year, 4 credits

FRED A. McNAMARA and PIERRE S. PALMER

A course designed for those desiring to acquire a broad knowledge of the field of hospital administration. The first semester deals with the history of hospitals; the scope and organization of voluntary and Federal hospital programs; general principles of organization as applied to both Federal and voluntary hospitals; the functional elements of hospitals; and application of modern management tools in hospital administration. The second semester deals with additional examples of the application of modern management tools in hospital administration; control of quality of professional care of patients; management problems in such areas of hospital administration as food service, supply management, and length of patient stay; and problems of coordination of Federal hospital operating and construction programs.

The course is conducted through lectures and discussion periods. Guest speakers from Federal and voluntary hospitals present several of the topics. Credit is given only upon completion of both semesters and registration is limited to those planning to take both semesters. *Prerequisite:* Familiarity with hospital operations.

PERSONNEL ADMINISTRATION

COMMITTEE

JAMES L. BUCKLEY (Chairman)

C. O. HENDERSON (Vice-chairman)

HENRY F. HUBBARD

HAROLD H. LEICH

WILLIAM T. McDONALD

JAMES C. O'BRIEN

ROSS POLLOCK

JOHN A. WATTS

The student is urged to take the introductory course in public administration before concentrating on the program in this division. Unless substantial experience can be substituted, the general

course, Public Personnel Administration, should be taken before the specialized courses (such as Position Classification, Selection and Placement, etc.). Persons who are in positions classified at GS-5 or below and desire to prepare for personnel work should begin with Federal Personnel Procedure in the Department of Office Techniques and Operations. They should not attempt to take the specialized courses until they have gained substantial experience in personnel work or have completed all basic, general courses.

6-430. Public Personnel Administration

Fall, 3 credits. Repeated in Spring

JERRY C. DOSTER

Designed for supervisors and administrators wishing to have general familiarity with personnel work, for those in junior personnel staff positions desiring a broad understanding of personnel administration, and for those desiring to enter the field who need a foundation for the more specialized courses in the personnel field. Personnel problems that arise when people are associated together in a work situation; basic personnel policies and practices necessary and useful in treating personnel problems; differences between responsibilities, with respect to personnel administration, of the supervisor and the personnel officer; the various phases of personnel work; study of merit system and forms of organization; civil service legislation at various governmental levels; relationships between the Civil Service Commission and operating agencies and personnel offices of latter; trends in public personnel administration and its relationship to overall management.

6-444. Position Classification

Fall, 2 credits. Repeated in Spring

WILLIAM C. LAXTON and JOSEPH P. FINDLAY

Covers the fundamental concept of position classification and its uses; relation of classification to compensation and other phases of personnel management; analysis of Classification Act of 1949; identification, analysis and application to specific positions of factors determining class and grade levels; discussion of job evaluation techniques; and application of position classification in the Federal service including operating policies, practices and procedures. *Prerequisite:* One of the following: Courses 6-344 or 6-430 in Public Administration; Grade GS-4 or above in personnel work; 60 semester hours of college work.

6-448. Wage Administration

Fall, 2 credits

JAMES A. LAMBIE

Purposes, principles and methods of wage administration, with primary emphasis on compensation plans for trade, craft, and labor occupations. Study and discussion of various concepts and methods currently used in government and industry, including job analysis, job evaluation, labor market analysis, wage surveys, schedule construction, and within-grade advancement plans. *Prerequisite:* One of the following: Course 6-444, or experience in position classification and/or wage administration work.

6-458. Advanced Wage Administration

Spring, 2 credits

JAMES A. LAMBIE

Problems in administering wage programs; compensation of supervisors; pay relationships among white and blue collar positions; incentive systems; the role of line management in wage programs; coordination of wage programs; labor relations aspects of pay fixing. *Prerequisite:* One of the following: Course 6-448 or experience in wage administration work.

6-512. Employment and Placement

Spring, 2 credits

MILTON M. MANDELL

Use of tests, selection, interviewing, promotion systems, assignments, transfers, and methods to insure the proper utilization of personnel. Selection and placement for engineering, managerial, and office jobs. Class discussion determined by specific student interests.

6-518. Organizing and Administering a Personnel Development Program

Fall, 3 credits

JAMES G. STOCKARD

Personnel training and development as a line responsibility. Determining needs for training and development, organizing for training, evaluation of training at all levels in the organization. Consideration of the role of the line organization in carrying on management development, executive development, and scientific, professional, and technical training. The role of top management in exercising its responsibility for developing the work force. Examination of new developments in training in the Federal Government, including proposed legislation, and consideration of the effects of these developments on the responsibilities of persons responsible for training policy and programs. Examination and evaluation of the experiences of governmental agencies and private industrial organizations in this field. The course is designed for (1) operating officials who influence the training policies and practices of their agencies through membership on training and development committees, panels, and boards, and (2) staff officials who have agency-wide staff responsibilities for training and development. Persons who anticipate moving into either of these two roles in the near future also are eligible.

LEGAL ADMINISTRATION

COMMITTEE

THOMAS J. FLAVIN (Chairman)

RALPH F. KOEBEL

DAVID REICH

ASHLEY SELLERS

6-320. Introduction to Administrative Law and Procedure

Fall, 2 credits

EDWARD C. JOHNSON

A survey, for the general student, of the nature of administrative law, its subject matter, and methods of administration. The rule-making and adjudicative or determining procedures by federal and state regulatory agencies and the remedies against administrative action receive special consideration.

The increased complexity of modern society has meant that administrative tribunals have played an expanding role in the regulation of life and property. This course includes a study of the law that controls and the regulations that are made by governmental officers to implement that law. A survey of economic and social forces involved in regulatory action. Material used includes regulations, orders and decisions of federal, as well as state and municipal bodies, which acquaints students with current developments in administrative law and procedure. Topics covered include: powers and duties of administrative authorities as they relate to the supervision of public, as well as private interests; means of enforcing decision; remedies against official action; legal qualifications for office; legal disqualification of officers; appointment, tenure, removal and compensation of officers; and related matters.

6-422. Business Law

Year, 2 credits each semester

EDWARD C. JOHNSON

Aspects of law essential to the conduct of modern business. Forms of business organization, bailments, property, sales, mortgages, negotiable instruments, contracts. This course is so arranged that students may attend both semesters or either semester. No subject matter, however, will be repeated.

6-425. Legal Aspects of Investigation—Criminal Evidence and Procedure

Spring, 2 credits

RALPH F. KOEBEL
JAMES D. FORBES

Designed to provide investigative personnel and those desiring to prepare for such work, a background and insight into the legal aspects of their investigations: what types of evidence to seek; circumstances and conditions under which the evidence is to be obtained in order to have adequate probative value; and how to prepare such evidence for presentation in court or for other procedure. Since all investigations are potential sources of prosecution, the requirements of criminal evidence and procedure often reach into the early stages of investigation. The instruction is designed to provide understandable information without overemphasis of technical aspects.

PROCUREMENT AND PROPERTY MANAGEMENT

COMMITTEE

TONY M. BALDAUF (Chairman)

Courses in this field deal with how the Government purchases, manages and accounts for materials and supplies. Those interested in purchasing but with limited experience in such work will find it helpful to begin with the courses in Federal Purchasing Procedure and Federal Property Procedure before attempting the management courses.

Selected background courses in public administration together with courses in the Division of Organization and Management will provide a thorough training in administration in this area.

6-367. Federal Contracting

Spring, 2 credits

TONY M. BALDAUF

A course devoted to contracting as a technique of purchasing where advertising is required, including the study of legal and administrative policy background of contract provisions, requirements of advertising, analysis of bids, contract award and administration, the handling of disputes, appeals, protests, change orders, amendments, construction contract procedures, debarment procedures, and related subjects. The practical application of these requirements by preparation of bids, contracts, orders, and related matters.

6-455. Management of Government Supply

Fall, 2 credits

TONY M. BALDAUF

An advanced course to be presented by lectures by various experts in the supply field, on legal background, organization of agency supply operations, stores management, standards, motor vehicle management, survey techniques, control, distribution, and other staff and operating phases of supply management.

6-638. Government Defense Contracts

Fall, 2 credits

JULIUS SILVERSTEIN

Laws and problems in defense contracting by the Federal Government, including such subjects as cost-plus contracts, contingent fees, priorities, subcontracting, escalation, financing, renegotiation, contract termination, and surplus property.

8-405. Principles of Specifications

(See p. 88)

ACCOUNTING

COMMITTEE

JOHN C. COOPER (Chairman)

PAUL L. APPLEMAN

ROBERT H. FUCHS

WARNER H. HORD

CHARLES N. MASON

ROBERT W. MAXWELL

HERSCHEL C. WALLING

The Graduate School offers accounting courses primarily as a means of training for the *public* service. The curriculum necessarily includes courses in general accounting because the basic principles are essential for Government accounting.

CERTIFIED STATEMENT OF ACCOMPLISHMENT IN ACCOUNTING

The scope of accounting in the Federal service is wide. There are increasing demands for accountants having a knowledge of commercial as well as Government accounting. These demands have come as a result of the formation of many Government corporations and Federal regulatory agencies, and the development of the Joint Program to Improve Accounting in the Federal Government. The Joint Program is a Government-wide cooperative effort under the joint leadership of the Comptroller General of the United States, the Secretary of the Treasury, and the Director of the Bureau of the Budget, to make accounting of maximum usefulness to all concerned. Its purpose is to give the President better management in the executive branch, the Congress better information for acting upon appropriations and other legislation, and the public a clearer picture of the financial condition and operations of the Federal Government. Hence, the accounting program required for a Certified Statement of Accomplishment is broad enough to cover not only the regular appropriation accounting of the Federal Government, but also the accounting training needed for many other governmental activities. The program is comprehensive enough both to provide advanced training for the Government service, and also, if courses are carefully selected, to meet the usual educational requirements for C.P.A. examinations. Students planning to take C.P.A. examinations should know the requirements of the state in which they plan to take the examination. In general, their study, in addition to accounting, should include the following: Principles of Economics, Corporation Finance, Investments, Mathematics of Accounting and Investment, Business Law, Statistics, Business English, Principles of Marketing and Industrial Management.

Requirements for Certified Statement

1. High school diploma or equivalent.
2. Thirty-six semester hours of credit with grades of "C" or better in courses outlined below and distributed as follows:
 - a. All of the required courses.
 - b. No less than three semester hours credit from the Accounting Elective Courses.
 - c. No less than six semester hours credit from the Related Elective Courses.
 - d. The remaining semester hours credit may be taken in either of the two elective groups.

REQUIRED COURSES

<i>Courses</i>	<i>Number of Semesters</i>	<i>Semester Hours Credit</i>
Principles of Accounting	2	6
Intermediate Accounting	2	6
Cost Accounting	1	3
Auditing	2	4
Advanced Accounting	2	6

ACCOUNTING ELECTIVE COURSES

Elementary Federal Government Accounting	1	3
Advanced Federal Government Accounting	1	3
Federal Income Taxes	1	3
Analysis and Interpretation of Financial Statements	1	2
Mathematics of Accounting and Investment	1	3
Budgetary Administration	1	2
Accounting Systems	1	2
Cost Accounting (Second Semester)	1	3

RELATED ELECTIVE COURSES

Financial Organization and Procedures of the Federal Government	1	2
Internal Auditing	1	2
Business Law	2	4
Principles of Economics	2	6
Principles of Statistical Analysis	2	6
Writing Procedures and Instructions	1	2
or Introduction to Official Writing	1	2

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6-352^a. Principles of Accounting—First Half

Fall, 3 credits. Repeated in Spring and Summer

HERBERT G. MARSHALL
 WILLIAM H. ROWE
 STANCL M. SMITH
 PAUL S. CARTER

Elementary principles of accounting; discussion and problems. At the end of the semester students will be prepared to do the accounting necessary for a

small business organization; *i.e.*, keep a complete set of books, draw up statements at the end of the fiscal period, adjust the accounts for accruals, deferred items, depreciation, etc., and close the books. *Prerequisite*: High school graduation or equivalent.

6-352^b. Principles of Accounting—Second Half

Spring, 3 credits. Repeated in Summer and Fall

HERBERT G. MARSHALL
WILLIAM H. ROWE
STANCL M. SMITH
PAUL S. CARTER

Continuation of first half covering more advanced principles of accounting; accounting for partnerships, corporations and manufacturing; depreciation policies and analysis of financial statements. *Prerequisite*: First half or equivalent.

6-353^a. Intermediate Accounting—First Half

Fall, 3 credits

WARNER H. HORD
CLARK L. SIMPSON

Advanced principles of manufacturing accounting, corporation accounting, and valuation as applied to current assets, fixed assets, intangibles, and liabilities, reserves and funds, installment sales. *Prerequisite*: A first year course in accounting.

6-353^b. Intermediate Accounting—Second Half

Spring, 3 credits

WARNER H. HORD
CLARK L. SIMPSON

Advanced principles of partnership accounting, including formation, operation, and dissolution; joint ventures; consignments; agencies and branches; application of funds. *Prerequisite*: First half or equivalent.

6-264. Elementary Federal Government Accounting

Year, 2 credits each semester

CHARLES I. JENKINS

The fall semester is devoted to the discussion of basic accounting documents and explanation of, discussion on, and practice work with the basic ledgers (allotment ledger, objective classification ledger, and general ledger) maintained in connection with funds made available to Federal agencies; the appropriation, apportionment, allotment, disbursement, collection, and collection processes are discussed, and the relationship between administrative processes and accounts kept by the Treasury is explained. In the spring semester, this work and discussion are continued with respect to the general ledger but involving more funds and more complex transactions; the relationship between general ledger control accounts and related subsidiary records is explained and discussed; the reconciliation of cash accounts with statements furnished agencies by the Treasury is explained and discussed; the year-end closing of the accounts and the year-end financial reporting and its relationship between the agency and the Treasury are explained and discussed. In each semester, as applicable to the subject under discussion, related reporting and accounting procedures, and related General Accounting Office regulations are explained and discussed.

6-354. Advanced Federal Government Accounting

Fall, 3 credits. Repeated in Spring

CHARLES N. MASON

A review of the development of the accounting system for Federal funds and the present financial organization in which the accounting is performed with attention to the accounting responsibilities of each segment of the organization, including the Treasury Department and the General Accounting Office. De-

tailed study is given to the accounting problems of administrative agencies with special emphasis on the principles of controls and recent developments in accounting in the Federal government. *Prerequisite:* Intermediate Accounting, or Principles of Accounting and Elementary Federal Government Accounting.

6-420. Advanced Accounting—Theory and Problems

Year, 3 credits each semester

LAURENCE W. ACKER

A comprehensive study of advanced principles of accounting together with their application to specific problems. Special consideration is given to consolidated statements; foreign exchange; receivership; estates and trusts; public accounts. Emphasis is placed on problems in accounting theory and practice such as are generally given in C.P.A. examinations. *Prerequisite:* Intermediate Accounting.

6-423. Mathematics of Accounting and Investment

Spring, 3 credits

RALPH R. BOTTS

Calculation of compound interest, compound discount, amount and present value of annuities, including perpetuities and capitalization methods of determining valuation. Special attention given to accumulation of sinking funds and the amortization of debts by equal payments, with applications to open-end mortgages. Also covers yield and valuation of bonds, various depreciation methods, and exact and approximate methods of determining interest rates charged on time purchases and small loans. Some attention given to life probabilities and the calculation of premiums and cash values for the more common types of life insurance and annuities. Accounting applications and entries are discussed upon request.

6-510. Analysis and Interpretation of Financial Statements (1957–58 and alternate years)

Spring, 2 credits

HERSCHEL C. WALLING

Methods and techniques of preparing, analyzing, and interpreting financial statements of business and Government enterprises, particularly working capital and revolving funds and Government-owned corporations. Covers the nature and limitations of financial statements, and terminology, content, and organization, and the determination and interpretation of trends and ratios for both internal and external users of the financial statements.

6-525. Financial Organization and Procedures of the Federal Government (See p. 67)

[6-642.] Cost Accounting

Year, 3 credits each semester (alternate years)

JAMES H. LOBB
HARRY W. RICE

A thorough and comprehensive treatment of the principles of cost accounting, together with the methods of their application to specific problems. By means of lectures, textbook study, and problems, full consideration is given to the methods of cost accounting for materials, labor, direct and indirect expenses in their relationship to specific job orders; process, departmental and standard costs; and the control accounts. *Prerequisite:* Principles of Accounting.

6-645. Federal Income Taxes

Fall, 3 credits

EUGENE C. MOYER

Principles of federal income taxation applied to individuals, partnerships and corporations for determination of gross income, deductions credits and exemptions. Forms of various tax returns; application of principles of accounting.

[6-684.] Internal Auditing (1958-59 and alternate years)

Year, 2 credits each semester

JOHN C. COOPER

This course is intended to provide a comprehensive understanding of the philosophy and purpose of internal audit. Primary emphasis is placed on the use of this function as an aid to management and operating officials in the Federal Government. The course reflects the current concept that internal auditing is an important management control that functions by review and appraisal of other management controls, and, accordingly, (1) reviews and appraises the adequacy of policies, plans, and procedures, (2) ascertains compliance with policies, plans, procedures, regulations, and laws, (3) ascertains whether agency assets are properly safeguarded and accounted for, and (4) ascertains the degree of reliability of accounting and supporting statistical data. Placement of the internal audit function in the organization, its relationship to line operations and line inspections, and its relationship to external audits are described. Staffing and organization of an internal audit unit, planning of audits, techniques for performance of audits, audit manuals, and reports are covered with illustrations from actual situations. The second semester deals with specific applications in the Federal Government and case studies, including guest lecturers who are conducting internal audit operations. *Prerequisite:* Experience in internal audit, administrative or management analysis at GS-7 level or above, or completion of courses in advanced accounting or auditing.

6-693. Auditing (1957-58 and alternate years)

Year, 2 credits each semester

JOHN C. COOPER

The fall semester is devoted to the study of the fundamental principles of public or commercial-type audits. Consideration is given to the purposes and types of audits; the responsibility of the auditor; planning and performing audits. Special emphasis is placed on problems in audit theory and practice such as are generally given in C.P.A. examinations.

In the spring semester, emphasis is placed on case studies in auditing and the application of audit principles. *Prerequisite:* Intermediate Accounting.

6-696. Fundamentals of Controllership

Fall, 3 credits

EDWIN T. NOLAN

Discussion of basic controllership functions and responsibilities. A review of the statutory and other influences leading to development of the concept, together with typical existing controllership organizations in the Federal Government. Review of the basic elements of controllership, *i.e.*, accounting, budgeting, management analysis and internal review, and their end relationship in an effective controllership operation. *Permission of the Registrar is required for admission to this course.*

6-360. Hospital Business Administration I: Accounting, Statistics, and Finance (See p. 68)**6-361. Hospital Business Administration II: Cost Analysis Methods and Budgeting (See p. 68)**

Social Sciences

DEPARTMENTAL COMMITTEE

BUSHROD W. ALLIN (Chairman)

JOHN M. BREWSTER
MARY L. COLLINGS
SHERMAN E. JOHNSON
PAUL E. NYSTROM
HAROLD B. ROWE

CARL C. TAYLOR
JAMES E. THIGPEN
HARRY C. TRELOGAN (Vice-chairman)
FREDERICK V. WAUGH
BENNETT S. WHITE

PURPOSE AND SCOPE

Social science deals with people and the problems of human relationships, as contrasted with natural or physical science, which deals with things and the problems arising out of physical relationships.

The problems of social organization and operation have become both absolutely and relatively more important with the increase in complexity of our industrial civilization. More and more, people are concerned with the organization of production, the distribution of goods and income, and with price policies. The individual as a consumer and investor, the businessman and the farmer as producers, find increasing need for a knowledge of economics and other social sciences. Large corporations are employing growing numbers of economists to help in the formulation of policy. Psychologists and social workers are finding a demand for their services in personnel work. And, the large number of Federal, state and local government agencies need more people adequately trained in social science.

Social science is divided into a number of closely allied fields including economics, sociology, political science, history, law, and psychology. A broad grasp of any one of these subjects implies at least some familiarity with the others, because of the many interrelationships among these studies. Yet the continued development of each social science has given rise to larger and still larger bodies of knowledge relating to it, until only through a considerable degree of specialization can the student hope to master any one part. Thus the great need is for people who have concentrated sufficiently on one phase of a social science, such as marketing in economics, to be thoroughly familiar with the details of fact and principles involved, yet who also have a broad underlying training in the allied fields.

The courses offered by the Graduate School are designed to aid in acquiring a general background in the social sciences, as well as the specialized training in particular fields that is necessary for

successful work in many Government departments and in private business.

GENERAL ECONOMICS

COMMITTEE

BUSHROD W. ALLIN (Chairman)

JAMES P. CAVIN

FREDERICK D. STOCKER

NATHAN M. KOFFSKY

WILLIAM A. VOGELY

CLAYTON E. WHIPPLE

Adequate foundation training in general economics is essential for satisfactory accomplishment in the study of any specialized branch of the subject. Hence, the primary objective in developing the following list of courses has been that of providing the basic work needed, by students who wish to carry out a systematic plan of study, at both undergraduate and graduate levels.

7-201. Principles of Economics

Year, 3 credits each semester

FREDERICK D. STOCKER

A survey course designed to familiarize the student with the basic tools of economic analysis. Emphasis is given to the application of economic principles to policy questions, both of current and continuing importance. Among the topics covered are (1) production, income, and the creation of wealth; (2) business organization and finance; (3) money and the banking system; (4) control of business fluctuations; (5) international trade; and (6) the distribution of income. While it is advisable that students registering for the second semester have completed the first semester, qualified students may be admitted at mid-year.

7-480. Money and Banking

Fall, 3 credits

JOHN E. REYNOLDS

The functions of money. Price levels and the value of money. Credit and credit instruments. Banks and the creation of credit. Evolution of the American banking system, and related institutions. The Federal Reserve System. Principles and practices of central banking and credit controls. Inflation, deflation, and business cycles. International monetary relations. *Prerequisite:* Principles of Economics or the equivalent.

7-481. Economic Fluctuations and Forecasting (1957-58 and alternate years)

Fall, 2 credits

NATHAN M. KOFFSKY

National income analysis as a tool for forecasting economic fluctuations. The meaning of the Income and Product accounts and the data that underlie them. The impact of changes in spending by consumers, business, and government on the total economy. The data that give clues to such changes, such as the Federal Budget, business investment plans, and consumer behavior. The national product "gap" analyses as a tool in measuring the direction and extent of changes in economic activity. Brief review of business cycle theory and measurement, including the Historical School and the work of the National Bureau of Economic Research. Analysis of the President's Economic Report. Long-term projections of economic growth. *Prerequisite:* A course in elementary economics and a course in statistics.

7-528. International Trade and Commercial Policy

Fall, 3 credits

WILLIAM A. VOGELY

The course is oriented toward an understanding of the role of international trade in the United States economy. A survey of the theory of comparative costs and international values forms the foundation for investigation of specific commercial policy problems. Balance of payments, exchange rates, tariffs, customs unions, and other problem areas are analyzed in the light of their effects on national income, employment, and national security. The institutional structure, including the Reciprocal Trade Agreements Act, the General Agreement on Tariffs and Trade, the International Monetary Fund, and the proposals of the Havana Charter, and empirical data on the pattern of world trade are stressed throughout. The course provides an overall view of the theory and practice of United States commercial policy. *Prerequisite:* Consent of instructor.

7-548. Economic Analysis (1957-58 and alternate years)

Year, 3 credits each semester

WILLIAM A. VOGELY

The course is concerned with methods of economic analysis. Emphasis is placed upon the exposition and evaluation of theoretical models explaining the relationships among various sectors of the economic system. Empirical applications of these tools of analysis are studied. The first semester is primarily concerned with analyses of the behavior of firms, households, and industries. The theories of demand, production, distribution, and price are studied intensively, including systems of both partial and general interdependence. The second semester is primarily concerned with analyses of the behavior of economic aggregates. The theories of employment, national income, and economic development are studied, with particular attention to the contributions initiated by Lord Keynes. *Prerequisite:* A course in the principles of economics.

[7-560.] Modern Economic Thought (1958-59 and alternate years)

Spring, 3 credits

BUSHROD W. ALLIN and JAMES P. CAVIN

A review of the ideas of the leading economic theorists of the past fifty years, including those of Marshall, Veblen, Commons, Mitchell, and Keynes. The purpose of the course is to help the student understand the relevance of the principal contributions of these men in dealing with the economic problems of the American economy.

7-570. Statistical Analysis Applied to Economic Problems

Year, 2 credits each semester (alternate years)

RICHARD J. FOOTE

The first semester deals mainly with analytical tools for measuring demand, using the single-equation approach. Emphasis is placed on the cases for which single equations appear to be valid, the statistical requirements that must be met if the method of least-squares is to be used, other statistical considerations involved in setting up the analysis, and the interpretation of results. The first half of the second semester is devoted to an introduction to the use of simultaneous equations in demand analysis, with application to the analysis of relations between competing and complementary commodities. Other topics depend on the interest of students: they might include spatial-equilibrium analysis and linear programming, endogenous mechanisms and the cob-web theorem, analysis of family budget data, sector analysis, or methods of studying effects of alternative government programs. *Prerequisite:* Principles of Economics, a course in statistics that included multiple regression analysis, and a working knowledge of elementary algebra.

APPLIED ECONOMICS

COMMITTEE

BUSHROD W. ALLIN (Chairman)

JAMES P. CAVIN

FREDERICK D. STOCKER

NATHAN M. KOFFSKY

WILLIAM A. VOGELY

CLAYTON E. WHIPPLE

Occasionally Government employees request the Graduate School to offer courses in which they are particularly interested, but which are not of an academic nature. When such requests are approved, the courses are offered, as in this section, without academic credit.

7-2. The How and Why of Stock Investments

Fall, non-credit

EMANUEL WOLF

Basic survey course designed to teach the investor the fundamental principles of investing in our modern securities market. All aspects of market operations including the internal operation of brokerage firms will be discussed. Investment decision-making will be the main objective. The course will assist in training those interested in becoming registered representatives of the New York Stock Exchange and the National Association of Securities Dealers.

AGRICULTURAL ECONOMICS

COMMITTEE

BENNETT S. WHITE (Chairman)

PHILIP F. AYLESWORTH

H. M. SOUTHWORTH

FLOYD E. DAVIS

ROBERT M. WALSH

HORACE R. JOSEPHSON

EVERETT C. WEITZELL

The great importance of enlarging and improving knowledge of the economics of agriculture is generally recognized. Constructive accomplishment in this field requires thorough training in economics combined with a comprehensive grasp of its application to the special conditions of agriculture.

The shortage of well-trained marketing personnel, at both Federal and State levels, critically handicaps developing a well-rounded program under the Agricultural Research and Marketing Act. The greatest immediate need is for men with advanced training who can undertake independent work in new fields. The broad expansion of activities scheduled under the Act also will continue and intensify the need for adequately prepared college graduates. On both problems, the Department of Agriculture is cooperating closely with the land-grant institutions. Joint committees have analyzed and mapped out an attack on these problems. As part of this plan, the Graduate School has given special advanced training to Washington personnel engaged in marketing work, and regularly offers both introductory and advanced courses in this field.

Upon request, arrangements can be made to take any of the following courses as reading courses whenever there is insufficient enrollment for a regular class. Students who are interested in such an arrangement should consult the Registrar.

7-5. Produce Operation in Retail Food Stores

Fall, non-credit

R. W. HOECKER

A basic course directed at the supermarket produce department manager on the correct handling, care, and merchandising of produce in the modern supermarket. The course content will be based on the most recent research findings of the Department of Agriculture combined with the most advanced practices followed by the supermarket industry. It will include a discussion of (1) production areas, seasonal variations, grades, and market news; (2) maintenance and evaluation of produce quality; (3) improved handling methods, operating practices, equipment, materials, and layout; (4) merchandising practices; and (5) food consumption, dietary standards, and nutritive values.

7-203. Introduction to Marketing (1957-58 and alternate years)

Fall, 3 credits

BENNETT S. WHITE

A preliminary course intended to provide orientation for the study of marketing as (1) a type of production that supplies essential services, and (2) a valuation process in which the prices of agricultural commodities are established. Marketing machinery costs, functions, methods and practices are surveyed. Marketing specialists of the Department of Agriculture will lead discussions relating to particular commodities and special problems. *Prerequisite:* A basic course in economics.

[7-409.] Farm Management

Spring, 2 credits (alternate years)

WYLIE D. GOODSSELL
ORLIN J. SCOVILLE

An advanced course in farm organization and management that combines development of economic principles of farm production with practical application to the planning and operation of farms of different types, sizes, and locations. The practical and theoretical aspects of purchasing, organizing, operating, and managing farms are treated. Consideration is given also to economic adjustments needed in specific farming areas and for the nation.

[7-414.] Economics of Marketing

Year, 2 credits each semester (alternate years)

H. M. SOUTHWORTH and HARRY C. TRELOGAN

An advanced course in which economic aspects of marketing agricultural commodities are systematically analyzed, with main emphasis on applying modern economic concepts to the successive problem areas developed. The first semester considers marketing, including transportation, storage, processing, and distribution, as a process of production. It explores the use of resources in this production, the effects of market institutions and organizations upon the use of resources and the productive services performed, and the criteria of efficiency of this productive process and of public policy designed to improve it. The second semester considers the market as a mechanism for establishing prices. It explores the functions of market prices, the process of price-making, the effects of market organization and practices, and the relationships between margins and the costs of productive services in marketing, and the criteria of efficiency in price-making and of public measures that regulate or intervene in the price-making process. *Prerequisite:* Principles of Economics and Introduction to Marketing, or equivalent as approved by instructors.

7-472. Production Economics of Agriculture (1957-58 and alternate years)

Fall, 3 credits

KENNETH L. BACHMAN and RUSSELL W. BIERMAN

The development and application of basic economic principles and analytical methods important in agricultural production. Application of economic principles to the determination of the most profitable combination of production resources and enterprises from the standpoint of both the individual farm and United States agriculture. Particular problems studied are agricultural risk and uncertainty, changes in agricultural production and practices, agricultural finance, credit and insurance, land values and tenure, and low income farms.

7-475. World Agriculture and Foreign Markets

Year, 2 credits each semester

CLAYTON E. WHIPPLE and ASSOCIATES

The influence of climate, soil, topography, and density and distribution of population on world agriculture. The problems encountered in collecting and analyzing statistics on world production, trade, and consumption of principal crop and livestock products. How countries of strategic importance have adapted their agriculture to climatic and economic conditions.

7-575. Agricultural Prices

Fall, 2 credits

HAROLD F. BREIMYER

This is a broad course that presents some of the main results of research in agricultural prices and provides an introduction to research methods in this field. Discussion of trends, seasonal variations, and cycles in agricultural prices. A survey of available information about the effects of price changes on the consumption and production of farm products. How agricultural prices are affected by changes in such economic factors as business conditions and consumer incomes, as well as by changes in Government programs and policies. An analysis of geographic price differences in relation to such factors as transportation rates, methods of marketing, and differences in variety, grade, and quality. *Prerequisite:* Elementary courses in statistics and in economic theory.

7-716. Agricultural Policies and Programs—Seminar (1957-58 and alternate years)

Spring, 2 credits

ORIS V. WELLS

Analysis and evaluation of current agricultural policies and programs with special reference to planning and programming techniques and processes, including a review of policy and program development from World War I to date. Agricultural policies and programs will be considered in relation to economic principles as well as the chief trends or forces operating within the national economy as a whole. An effort will be made to consider all the main streams of agricultural policy, including problems relating to research and education, marketing, and land use and conservation, as well as farm price supports. *Prerequisite:* A college degree in agriculture or a related field with some courses in economics, or operational responsibility in agricultural programs.

7-719. Resource Economics—Seminar (1957-58 and alternate years)

Spring, 3 credits

MARK M. REGAN

Practices and problems in the economic analysis of land and water resource programs. Study of prevailing and proposed practices for project formulation, economic justification and cost sharing. Analysts and administrators of various resource agencies participate in discussions of their special fields. *Prerequisite:* Graduate work in agricultural economics, or consent of instructor.

7-720. Production Policies and Programs (1957-58 and alternate years)

Fall, 2 credits

SHERMAN E. JOHNSON

A seminar dealing with special problems in the broad field of economics of production. Attention is given to economic aspects of rural development, allotment, soil bank, conservation, credit, and insurance programs. Students prepare papers on problems of interest in their special fields. Different research workers and administrators participate in the discussion of current problems under the guidance and coordination of the instructor. *Prerequisite:* Graduate standing, including some courses in economics, or consent of the instructor.

7-722. Marketing—Seminar (1957-58 and alternate years)

Spring, 2 credits

HARRY C. TRELOGAN

A seminar for advanced students interested in current research and service developments. Selected projects are reviewed to indicate newer research techniques and service methods used in agricultural marketing. Projects are examined in terms of background need for the work, objectives of the activities, and relationships to other phases of a general program of marketing research. Economic, statistical and management problems involving market costs, quality, organization and information are featured in the material selected for analytical review. A term paper on a related topic will be required for credit. *Prerequisite:* Courses in elementary economics and statistics plus advanced courses or responsible experience in marketing.

2-339. The Literature of American Agricultural History
(See p. 24)**TRANSPORTATION****7-245. Transportation Rates and Rate Determination**

Fall, 2 credits

SIDNEY C. DOWELL

The use of traffic documents, commodity classifications, tariffs, and traffic publications for the several forms of transportation. Study of rate principles and the history of major rate adjustments. *Prerequisite:* Experience in some aspect of transportation work.

COOPERATIVE EXTENSION EDUCATION**COMMITTEE**

MARY L. COLLINGS (Chairman)

J. E. CROSBY, JR.
JOSEPH P. FLANNERY
MAX K. HINDS
CHESTER C. LANG

ALICE LINN
JOSEPH L. MATTHEWS
LESTER A. SCHLUP
KENNETH F. WARNER

Cooperative extension education consists of the off-campus, non-resident teaching service of the land-grant institutions in cooperation with the USDA and the leadership of a county. It is the largest non-school educational program in the United States. The growing interest, on the part of county agents, supervisors, specialists, and training personnel, in advanced study under the guidance of the Federal extension staff has led the Graduate School to appoint a committee on Cooperative Extension Education. This committee

has the responsibility for giving guidance to students toward a program best suited to the individual's needs, within the framework of the Graduate School. This program may well lead to an advanced degree depending upon the plans of the student and the cooperative arrangements with local educational institutions and the Graduate School.

The following courses are given as the demand justifies:

7-535. Methods of Evaluating Educational Programs

Fall, 2 credits

MEMBERS OF STAFF OF EXTENSION RESEARCH AND TRAINING
DIVISION, FEDERAL EXTENSION SERVICE

Clarification of objectives, data collection, sampling procedures, analysis, interpretation, presentation, and use of data. This course is especially adapted to extension programs, but principles and procedures are applicable to all voluntary educational programs. It is not the intention to make a "studies expert" of each student, but to give a broad concept of methods of systematically appraising work and programs.

7-596. Development of Extension Programs

Spring, 2 credits

MEMBERS OF STAFF OF EXTENSION RESEARCH AND TRAINING
DIVISION, FEDERAL EXTENSION SERVICE

A systematic study of methods of developing voluntary county educational programs, including sources of essential basic information; the role of lay people and of supervisors, specialists, and county workers; use of planning committees; step-by-step procedures; coordinated county plans; and characteristics of good programs. Special reference will be made to Extension programs, but principles and procedures are applicable to all voluntary educational programs.

7-732. Four-H Club Programs—Seminar

Spring, 3 to 5 credits

E. W. AITON

Major emphasis in this seminar is on objectives and principles for planning effective educational programs for rural young people at the county level. Class periods are devoted to presentations, discussion, and some lectures. Individual problems of class members are considered.

HUMAN RELATIONS

COMMITTEE

JOHN M. BREWSTER (Chairman)

KATHARINE P. BEARDSLEY

FORREST E. CLEMENTS

JOSEPH F. GREEN, JR.

MARGARET JARMAN HAGOOD

CONRAD F. TAEUBER

CARL C. TAYLOR

Courses in human relations are planned to meet the needs of four types of students: (1) those who wish a general rather than specialized knowledge of social problems and processes; (2) those who wish substantial first undergraduate courses in sociology and psychology; (3) those who wish specialized undergraduate and graduate courses in these same fields; and (4) mature persons who wish courses that use the knowledge of all social sciences in considering public issues and policy.

7-210. General Psychology

Fall, 3 credits

RICHARD S. FITZPATRICK

Psychological theory and principles, based on experimental fact and observation, and interpretation of human relations that begin with the development and capabilities of the human personality. Adjustment of the personality to environment. Lack of proper adjustment and the resulting varying degrees of mental illness calling for psychotherapy. How man sees his world; what influences his relations with his environment and examination of these relations in selected human situations: marriage, job, and such problem areas as delinquency, crime, and addiction. Students take a selected group of psychological tests during the course.

7-211. Introduction to the Social Sciences

Fall, 2 credits

SHERIDAN T. MAITLAND

An overview of the contributions of the various social sciences to the understanding of modern society. An integrative course for students who have not had an opportunity to study any of the social sciences, particularly sociology, anthropology, and economics. Designed to acquaint students with the major concepts used by the social sciences in describing and analyzing group and institutional behavior.

7-214. Psychological Warfare

Fall, 2 credits

ARTHUR E. WAY

Designed to acquaint students with the techniques and applications of psychology as an instrument of national policy. The course will cover such areas as cold war, hot war, leafleteering, mass media, public opinion, and the like.

7-400. The Principle of Least Effort and General Semantics

Fall, 2 credits

J. A. SAUNDERS

General Semantics may be defined as a study of human responses to language and other symbols; the relationships between words and things and between language and human behavior. It may be considered as a synthesis of science and the formulation of the general methods of science in such a way that they may be applied by the average individual to help him solve his every problem. The great majority of people who learn to apply the principles and methods of semantics find that these facilitate communication between individuals and between groups; eliminate the common errors in thinking that practically everyone makes at times and enables them to find more appropriate solutions to many of their problems (personal, professional, economic and social) in a shorter period of time and with less expenditure of energy.

[7-442.] Personality Disorders

Spring, 2 credits (alternate years)

ALBERT C. CORNSWEET

This course through lectures and case discussion deals with personality variations as seen among normal people, stressing the significance of such variation in social and occupational adjustment, and with major types of abnormal personalities with emphasis on recognition of these deviations. Designed to help meet the needs of placement officers, counselors and others who through interviews or other media must recognize and deal with problems of emotional maladjustment. *Prerequisite:* A course in general psychology or equivalent.

7-482. Social Psychology of Communication (1957-58 and alternate years)

Fall, 3 credits

RICHARD S. FITZPATRICK

Interpretation of communication research studies in light of social psychological theory. Analysis of social psychological theory for insight into com-

munication habits and impact. Study of the social psychology of perception, value, leisure time, and cultural differences as they affect communications by mass media. Learning theory and educational level as they affect communication behavior. Communication behavior in selected cultures. Social psychological bases for opinion formation and implications of opinion shifts and changes. Analysis of communication systems and data for research purposes. Constructing a theory of the social psychology of mass media. *Prerequisite:* Permission of instructor.

7-533. Research Methods in Human Relations (1957-58 and alternate years)

Spring, 3 credits

RICHARD S. FITZPATRICK

Acquaints the student with the techniques available to solve problems involving human relations in an organizational setting by standard research methods. Students are required to identify problems, show how they have been studied in the past and suggest new or modified approaches for investigating them. Includes systematic examination and appraisal of surveys (extensive, intensive, and informal interviews), scales, projective techniques, pencil and paper tests, observational techniques, re-analysis of existing data, field and laboratory experiments. *Prerequisite:* Courses in sociology and psychology.

7-541. Improving Human Relations and Group Behavior

Fall, 2 credits. Repeated in Spring

CARL F. BAUER

This course is designed to provide diagnostic practice training and experience in bettering human relations, group behavior, and in solving group problems of conflict, apathy, and inadequate decision-making. Includes training in the leadership team method in terms of occupational and organizational settings where groups are important instruments of deliberation, action, and learning. Skill practice in relationship therapy, non-directive counseling, free association discussion and its value, problem-inventory, feed-back, evaluation, role-playing, and the group decision method. The course is based upon a theoretical study of four major approaches to the investigation of modern group life.

6-453. Human Relations in Administration (See p. 63)

7-730. Seminar—Cultural Change in Contemporary Cultures

Fall, 2 credits

M. L. WILSON, THELMA A. DREIS, and SPECIALISTS

A survey of past and present international and national programs in the field of technical assistance in cooperation with other countries. Analysis and discussion of case histories. Presentations by individuals who have had significant experience in connection with Point IV programs. Development of criteria for evaluating the effectiveness of these programs and the basic problems, principles and lessons for the future that grow out of them. Administrators, social scientists, educators and various technical people in Washington who have had Point IV experience meet with the seminar. Special emphasis given to the development of programs by foreign countries and problems of coordination in the fields of agriculture, health, education, public administration and resource development. Consideration of various types of methods and techniques at the village level, together with techniques connected with training, administration, and evaluation. While the point of view of the course is the total culture and economy of a country, emphasis is placed on the rural aspects and village development with some consideration of urban programs.

6-250. American History to 1865 (See p. 65)

6-251. American History Since 1865 (See p. 65)

Technology

DEPARTMENTAL COMMITTEE

R. G. HAINSWORTH (Chairman)

EVAN L. FLORY
ROWLAND LYON
ELBRIDGE C. PURDY

J. P. SCHAEZNER
E. J. STOCKING
G. C. TEWINKEL

ROBLEY WINFREY



Various departments and agencies of the Federal Government are engaged in programs such as flood control, soil conservation, power development, mapping, and rural electrification, which involve in varying degrees engineering techniques and professional engineers. They include many functions that require a working knowledge of techniques not provided in the standard engineering courses.

Basically, education in engineering schools is limited by necessity and tradition to a period of four or five years. This short period of training provides sufficient time to assimilate and master only a minimum of the basic sciences. There is little time available for courses that will give the technical student an understanding of the social and economic problems of the world about him. As a result, he fails often to appreciate the impact upon society of the advances of his profession. Moreover, technological techniques and practices are never static, and developments in the sciences and in engineering require enlarging and constant reorienting of the engineer's technical background.

The Graduate School, working with representatives of the various Government departments and agencies and of the local chapters of engineering societies, offers courses designed to add to the technical, professional, and administrative background of engineers in the service of the Federal Government. Many courses offered provide training in the latest techniques that colleges and technical institutes often cannot provide.



ENGINEERING

COMMITTEE

J. P. SCHAEZNER (Chairman)

ROBERT T. BERGMANN
J. A. C. CALLAN
J. H. GEHRING
FERDINAND KAUFHOLZ

E. J. PETERSON
WILLIAM D. POTTER
HENRY A. SAWCHUK
F. F. SNYDER

If there is sufficient demand, courses similar to the Electrical Engineering Review for P. E. Examination will be given in other engineering fields for students who wish to review for the D. C. Professional Examinations.

8-92. Engineering Review for P. E. Examination

Fall, non-credit. Repeated in Spring

PAUL S. DELL'ARIA

A general refresher course in basic sciences and engineering principles intended to assist in preparation for the basic portions of the District of Columbia Professional Engineer's License Examination (not specific branches of engineering). Covers elements of strength of materials, structures, fluid mechanics, mechanical engineering, electrical engineering and engineering economics. *Prerequisite:* Preferred, those qualified to take the P. E. examination.

8-95. Electrical Engineering Review for P.E. Examination

Fall, non-credit. Repeated in Spring J. J. A. JESSEL and ALMON D. THOMAS

A refresher course for persons who are preparing for the D. C. Professional Engineer's License Examination in the field of electrical engineering with emphasis on power. Solutions of practical problems. *Prerequisite:* Preferred, those who are qualified to take the examination.

8-110. Principles of Electricity

Spring, 2 credits

DAVID ASKEGAARD

Principles of electricity, emphasizing alternating currents. Covers basic units such as voltage, current and power and their measurement, resistance, voltage regulation, line loss, power factor, three phase systems, etc. The function of equipment used on rural electric distribution systems such as generators, substations, transformers, lightning arrestors, fuses, oil circuit reclosers, etc., will be emphasized.

8-115. Practical Radio and Television

Year, 3 credits each semester

ROBERT HAUPTMAN

A lecture-demonstration course covering the practical aspects of radio, television, and allied subjects. The use of mathematics is held to a minimum and the basic studies are undertaken in a simple descriptive manner. The first semester deals with electronics fundamentals, amplifiers, and radio receivers. Specific topics include: principles of electronics and radio; electronic components; DC and AC circuit characteristics and analysis; electron tubes; amplifiers; radio receiver fundamentals and applications. The second semester deals with radio transmitters, FM, TV, and miscellaneous subjects. Specific topics include: radio frequency regeneration; radio transmitter fundamentals and applications; fundamentals and applications of frequency modulation and television; propagation, radiation, and antennas; sources of power; test equipment.

This is not a laboratory class. An electronics demonstrator is used in class. Purchase of a radio kit is optional with the student. *Prerequisite:* A general knowledge of algebra and physics of at least high-school level.

8-405. Principles of Specifications

Fall, 2 credits

BENJAMIN ROSENZWEIG

A basic course in the principles underlying the government specifications systems. A brief survey will be made of procurement documents and the purposes they serve. The organization of specifications for form, clarity, and effectiveness will be demonstrated. The evolution and ramifications of specifica-

tions will be considered with regard to research and development; legal and contractual relations; proprietary items; and government inspection. The division of specifications into performance and formulation types will be reviewed. The problems of standardization and industry coordination will be discussed. *Prerequisite:* Knowledge of procurement, inspection, research and development processes, or specification writing.

8-465. Applied Electronic Theory

Year, 2 credits each semester

H. WALTER PRICE

General principles of electronics; basic characteristics of resistance, capacitance, and inductance taken singly and in combination; practical basic components; elementary circuit analysis particularly as it pertains to series and parallel resonance; circuits with distributed constants; generation and propagation of radio waves; fundamental principles of electron tubes including diodes, triodes, and pentodes; voltage amplification.

The second semester is a continuation and elaboration of subjects undertaken in the first semester: Class A, B and C power amplification; rectifiers and power supplies; sine-wave oscillators; amplitude modulation and detection; frequency modulation; transmitters; receivers including the superheterodyne; basic pulse circuits; fundamentals of television; theory and use of test equipment.

This is an intermediate level course stressing how electronic circuits work. Elementary complex notation will be introduced and extensively used. *Prerequisite:* Physics, algebra, trigonometry, DC electricity, AC electricity, or consent of the instructor. A knowledge of elementary calculus is helpful but not necessary.

8-525. Transistor Electronics

Fall, 3 credits

ALBERT M. RUBENSTEIN

An introduction to semiconductor principles, point contact transistors, junction transistor, p-n-p and n-p-n transistor characteristics, transistors as low and high frequencies circuit elements, transistor amplifiers and oscillators, measurement of small signal parameters (α , a and b), cascade amplifiers, noise in transistors, compensation for temperature variation, equivalent network circuits, and other related topics. *Prerequisite:* Bachelor's degree in physics or electrical engineering, or equivalent professional experience.

5-535. Elements of Fluid Mechanics

(See p. 55)

8-560. Fundamentals of Telephony—Outside Plant Design (1957–58 and alternate years)

Fall, 2 credits

THOMAS J. McDONOUGH

A course in the principles of outside plant design. Pole line, aerial wire, cable, protection, transposition systems and transmission improvement.

8-561. Fundamentals of Telephony—Central Office Equipment Design (1957–58 and alternate years)

Spring, 2 credits

THOMAS J. McDONOUGH

A course in the principles of central office equipment design. Design of major circuits, trunk circuit design, signaling and supervision, characteristics of the dial equipment of six manufacturers, traffic determinations for manual and dial systems, numbering, automatic message accounting equipment and other optional equipment and features, influence of toll dialing on central office design, latest advances in voice frequency repeaters, carrier and radio.

SURVEYING AND MAPPING

COMMITTEE

G. C. TEWINKEL (Chairman)

WALTER DIX

GEORGE H. EVERETT

JAMES P. FONDREN

GERALD H. JOHNSON

S. J. FRIEDMAN

J. E. KING

GUNNAR LEIFSON

ALBERT L. NOWICKI

ERNEST PARKIN

ROBERT H. RANDALL, JR.

Maps have played an important part in human progress. Today, as never before, they furnish the basis for both military and non-military activities throughout the world. Greater use of maps has brought increasing demand for persons qualified in each of the technical phases of map production and reproduction.

The purpose of the curriculum in surveying and mapping is to offer basic training for those persons who are engaged in the technical and supervisory aspects of map making. The curriculum is intended to give the student a broad knowledge and basic understanding of each of the separate phases of the science; to enable him to understand better the problems, possibilities, and limitations of each of the phases. He can then better plan his own activities toward the economical production of accurate maps. A large part of the curriculum is devoted to geodesy, a subject considered to be of increasing importance in view of modern rapid means of world-wide travel, the consequent need for world-wide charts, and the development of new methods in surveying.

CERTIFICATES OF ACCOMPLISHMENT IN SURVEYING AND MAPPING

Certified Statements of Accomplishment in Surveying and Mapping are granted to students who have completed organized courses of study intended to provide basic training for responsible surveying and mapping work. The background required is not necessarily a college degree, but accomplishment of the work leading to the Undergraduate Certificate provides training approximately equivalent to that gained from a year of technical college work. The student completing the courses leading to the Advanced Certificate has acquired technical knowledge at least at the level of the Master's Degree. While neither certificate requires entrance backgrounds of any specified level of college education, the student is reminded that completion of courses in the broader, non-technical subjects that are integral to the standard college curriculum is an important part of his general preparation for responsible work in his chosen profession.

UNDERGRADUATE CERTIFICATE

Requirements

1. High school graduation. Students should file with the Graduate School, before completion of their certificate program, a transcript of their high school or college record.
2. Thirty semester hours of credit with grades of "C" or better in courses as outlined below.
 - (a) Prerequisites: College algebra and trigonometry
 - (b) Required courses: (22 credits)

8-135. Elementary Surveying	(3)	8-222. Mathematics for Cartographers	(2)
8-204. Topographic Surveying	(3)	8-223. Map Projections and Grid Systems	(3)
8-251. Photogrammetry I	(3)	8-240. Cartographic Techniques and Map Reproduction	(2)
8-252. Photogrammetry II	(3)		
8-208. Aerial Photographic Interpretation	(3)		
 - (c) Related Electives: At least eight hours of credit in courses selected from the related electives listed below.

ADVANCED CERTIFICATE

Requirements

1. High school graduation. Students should file with the Graduate School, before completion of their certificate program, a transcript of their high school or college record.
2. Thirty semester hours of credit with grades of "B" or better in courses as outlined below.
 - (a) Prerequisites: College algebra, trigonometry, analytic geometry, and calculus.
 - (b) Required courses: (21 credits)

8-217. Astronomy for Engineers	(3)	8-424. Large Scale Maps	(2)
8-218. Geodetic Surveying	(3)	8-425. Small Scale Maps	(2)
8-219. Computation and Adjustment of Geodetic Observations	(3)	8-440. Elements of Geodesy	(3)
8-480. Photogrammetry III	(3)	2-226. Introduction to Official Writing or Technical Writing	(2)
 - (c) Related electives: At least nine hours of credit in courses selected from the related electives listed below.

Related Electives—for both the Undergraduate and Advanced Certificates (17 hours if both certificates are taken)

- | | | | |
|--|-----|--|-----|
| 8-215. Route Surveying | (3) | 8-465. Applied Electronic Theory or | (4) |
| 8-408. Advanced Aerial Photographic Interpretation | (3) | 8-115. Fundamentals of Radio and Television | (6) |
| 8-203. General Geology | (3) | 2-226. Introduction to Official Writing (Undergraduate only) | (2) |
| 8-205. Practical Geology | (3) | 5-360. General Oceanography | (3) |
| 5-455. Elementary Photogeology | (3) | | |
| 5-326. General Meteorology | (3) | | |

Equivalent courses are accepted by transcript from other institutions to meet a part of the certificate requirements. Students who wish to use credit earned elsewhere should present the transcript to the Registrar at the beginning of their program.

Students who began work toward the certificate before September, 1956, may follow the requirements outlined in the 1955-56 catalog.

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Surveying

[8-135.] Elementary Surveying

Fall, 3 credits (every third year)

ERNEST J. PARKIN

Use of the transit, level, compass and accessory equipment; adjustment of instruments; field methods of transit-and-tape traverse and engineers' leveling (differential and profile); computations connected with above including adjustment of traverses by compass and transit rules, computation of latitudes, departures, and areas. Lectures, classroom work, and field work. *Prerequisite:* Plane trigonometry.

[8-204.] Ground Methods of Topographic Surveying

Spring, 3 credits (every third year)

ERNEST J. PARKIN

Transit and stadia; plane table and stadia; approximate methods, special methods for peculiar conditions; Beaman stadia arc; Baldwin solar chart, etc. Lectures, classroom work and field work. *Prerequisite:* Elementary surveying and plane trigonometry.

8-215. Route Surveying (1957-58 and every third year)

Fall, 3 credits

ERNEST J. PARKIN

Theory and practice of surveying for railroads, highways, canals; preliminary and location surveys, cross sections, earthwork quantities and transition spirals. Lectures, classroom work and field work. *Prerequisite:* Elementary surveying and plane trigonometry.

8-217. Astronomy for Engineers (1957-58 and every third year)

Spring, 3 credits

ERNEST J. PARKIN

The fundamentals of the circular systems; basis of the determination of time, longitude, latitude and azimuth; the use of instrumental equipment such as altazimuth instrument, zenith telescope, meridian transit, sextant, astrolabe, zenith camera. Lectures, classroom work and field work. *Prerequisite:* Ground Methods of Topographic Surveying or equivalent or permission of the instructor.

[8-218.] Geodetic Surveying (1958-59 and every third year)

Fall, 3 credits

ERNEST J. PARKIN

Theory and practice of first- and second-order triangulation, traverse, leveling; use of base-line equipment, repeating and direction theodolites, geodetic leveling equipment; field computations necessary to insure accuracy of observations. *Prerequisite:* Elementary Surveying or permission of instructor.

[8-219.] Computation and Adjustment of Geodetic Observations (1958-59 and every third year)

Spring, 3 credits

ERNEST J. PARKIN

The office procedures in final computation and adjustment of field observations introduced in Course 218; least square approach to the adjustment of networks of traverse and leveling and simple triangulation figures. *Prerequisite:* Course 8-218 or equivalent or permission of instructor.

8-440. Elements of Geodesy

Fall, 3 credits

Instructor to be announced

Introduction to the elements of geodesy from the geometric viewpoint (basic fundamentals of triangulation and geodetic astronomy) and from the physical viewpoint (distribution of mass and density anomalies). Determination of the figure of the earth, role of deflections of the vertical, and datum determination. Spheroids and their use. The aim of the course is to develop the student to the point where he will be familiar with the interrelations of the separate fields within geodesy and the manner in which they supplement one another in extending our knowledge of the earth. This course is designed for those desiring a general or fundamental knowledge of the elements of geodesy. *Prerequisite:* College algebra and trigonometry.

Photogrammetry

8-120. Introduction to Photogrammetry

Fall, 2 credits

S. J. FRIEDMAN

Lectures and demonstrations in non-technical terms cover: the history and development of photogrammetric engineering; the importance of optics; basic principles of photography; types of aerial photography, aerial cameras, accessory equipment, and photographic aircraft; requirements of coverage, flight lines, tilt, and scale; photo interpretation and stereoscopes; requirements of horizontal and vertical control; radial plot and stereoscopic plotting instruments. Designed for persons who use aerial photographs in military planning and operations, highway development, agricultural land use and conservation, mineral and petroleum exploration, and in other engineering and industrial operations.

8-208. Aerial Photographic Interpretation

Fall, 3 credits

ETHAN D. CHURCHILL

Principles, techniques and applications of aerial photographic interpretation; history, concepts, types of aerial photographs, principles, techniques, and applications. Study, and use in various fields, of aerial photographs as a source of detailed natural and cultural information. *Prerequisite:* A general background in one of the following fields: surveying and mapping, cartography, geography, geology, forestry, agriculture, architecture, or allied engineering fields.

8-408. Advanced Aerial Photographic Interpretation (1957-58 and alternate years)

Spring, 3 credits

ETHAN D. CHURCHILL and Specialists

A seminar on the application of aerial photographic interpretation to specialized technical fields, such as forest, range, and wildlife management; agricultural soil, engineering soil and vegetation surveys; geology and petroleum geology; population census in rural and urban areas, etc. *Prerequisite:* Basic training in aerial photographic interpretation. Training in forestry, range management, wildlife management, agriculture, ecology, geography, geology, or engineering desirable.

8-251. Photogrammetry I

Fall, 3 credits

OTTO GUTENSON

Basic photogrammetric optics; basic geometric characteristics of aerial photographs; aerial cameras; photography and photographic material. Photographic scales and flight planning; radial line plotting methods; elevation determination; photo interpretation; mosaics. *Prerequisite:* College plane trigonometry.

8-252. Photogrammetry II

Spring, 3 credits

OTTO GUTENSON

Geometry of the tilted photograph; theory and use of oblique (tri-met) and horizontal photographs; rectification; theory and practice of the multiplex including equipment, orientation procedures, control, compilation, contours, bridging; stereoscopic plotting instruments. *Prerequisite:* Photogrammetry I as revised, or former courses, Photogrammetry I and II.

[8-480.] Photogrammetry III

Fall, 3 credits (alternate years)

G. C. TEWINKEL

Advanced theoretical details; compensation devices for lens distortion; sources of errors in photogrammetric processes; technique of analyzing systematic errors of bridging; introduction to analytical methods. *Prerequisite:* Photogrammetry II above, or former Photogrammetry IV.

5-455. Photogeology

(See p. 52)

Cartography**8-125. Introduction to Cartography**

Spring, 2 credits

WILLIAM A. FOSTER

The purpose of this course is to introduce the student to the broad field of cartography. This includes general instruction in the history of maps; the shape of the earth; the fundamental concepts of the most common projections; the basic principles of surveying, topography, hydrography, photogrammetry, oceanography and sketch mapping; the classification, evaluation, compilation, construction and revision of maps and charts; and the methods and techniques of reproduction. See also course 5-114, Maps and Charts, in the Department of Physical Sciences.

8-240. Cartographic Techniques and Map Reproduction

Spring, 2 credits

M. S. A. DELANEY and SPECIALISTS

Designed for persons engaged in the various phases of surveying and mapping. Covers modern media used in the preparation of the original and the original map copy itself for reproduction; the requirements of a good map/chart original; the advantages and disadvantages of photolithography, letter press, and gravure, including ozalid and photo-gelatin; color separation originals, negatives, and printing plates; combining half tones with the contour system. Provides the student with a broad working knowledge of the many steps involved in duplicating the map/chart original in black and white and multicolor work. Economy and precision in map-making are predicated on a knowledge of the process selected for reproduction.

8-222. Mathematics for Cartographers

Fall, 2 credits

GEORGE H. EVERETT

Introduction to the methods of applying mathematical principles to the problems of cartography and the substitution of geographical nomenclature in derived mathematical formulas. Review of selected theorems and mathematical formulas, and a study of their development and significance to cartographic problems. Emphasis is on method as developed in analytical geometry and trigonometry. The course should be useful to those who wish to review their mathematics as applied to cartographic problems, and to those who plan more advanced studies in the field of mathematical cartography. *Prerequisite:* College trigonometry.

8-223. Map Projections and Grid Systems

Spring, 3 credits

EDWARD W. FONFARA

Includes: basic principles with practical applications; computations; use of tables; layout; definitions; classifications; and characteristics. Identification of such standard projections as the polyconic, mercator, transverse mercator, Lambert conformal, gnomonic, and stereographic; and coordinate systems including rectangular, broad-area and true military grid.

This subject is presented from the practical viewpoint without the complex variable theory applications. *Prerequisite:* College trigonometry.

8-424. Large Scale Maps

Fall, 2 credits

JACOB SKOP

Includes a review of the fundamental principles of cartography and the application of these principles with emphasis on large scale maps. Specific topics include: types and scales of maps; classification of the earth's features and their interpretation in symbolization; names; drainage, relief, woodland and vegetation, and other cultural features; foreshore and offshore hydrography; public land surveys; methods and procedures for making large scale maps; pre-compilation preparation; aerial photography; horizontal and vertical control; classification surveys; the compiler and his work; compilation; editing and field checking; color separation drafting; photolithographic reproduction; and military grids.

Prerequisite: Map Projections and Grid Systems, or equivalent.

8-425. Small Scale Maps

Spring, 2 credits

ROBERT B. MERCREADY

Factors to be considered in selecting the projection for the map, the scale, and the material for the compilation; drawing the map and preparing it for reproduction; compilation, reproduction, and use of the Army Map Service series of maps: the Nautical Chart Series including their compilation, reproduction and application to navigation; the Aeronautical Chart Series including their compilation, reproduction, and application to air navigation. *Prerequisite:* Map Projections and Grid Systems, or equivalent.

FINE AND APPLIED ARTS

COMMITTEE

ROWLAND LYON (Chairman)

SADYE F. ADELSON

MARTHA L. HENSLEY

HOWARD B. DOMINICK

GARNET W. JEX

O. A. DE LA ROSA

Fine Arts

8-320. Pencil Sketching and Water Color Painting

Fall, 2 credits. Repeated in Spring and Summer

ROWLAND LYON

An informal class in theory and practice. Students may use either or both media.

8-321. Life Sketching

Fall, 2 credits. Repeated in Spring

DUANE A. McKENNA

A course in drawing based on the premise that the best artistic expression is the product of accurate observation and an adequate understanding of the life we would draw. A course, not in theory or technique, but a series of personal

experiences planned to impart an awareness and appreciation of motion, design, and form. The challenges of the class are basic but students with previous training find it a valuable refresher. Enrollment limited to eighteen to insure individual instruction.

8-323. Portrait Painting in Oil

Fall, 2 credits. Repeated in Spring

PIETRO LAZZARI

To enjoy this course the student need not have experience as an artist but must have the desire to achieve proficiency in portraiture.

Professional methods of painting oil portraits incorporating the basic techniques of the old masters and the spirit of modern art. Course includes sketching, line composition and light arrangement; color, theory and technique of painting in oil. All work done from life.

8-330. The Grammar of Art: Drawing and Painting

Fall, 2 credits. Continued in Spring

YUEN YUEY CHINN

A foundation course leading to an understanding and appreciation of the use of line, shape, tone, texture, and color in creative drawing and painting. Through personal supervision at the instructor's studio, the student is guided in the elementary practice of drawing and painting. The course is continued in the spring, for new students and for those who wish to go on from the fall semester.

8-333. Survey of Art

Fall, 2 credits

HUGH T. BROADLEY

The course is designed to establish the basic values that underlie artistic achievement and to develop an appreciation of these values before the objects themselves. From age to age these basic values—the aesthetic values—remain the same. The lectures will attempt to relate the major epochs to one another so as to indicate the continuity of art history and at the same time contrast the variant forces and ideas that produced such differing styles and expressions.

8-334. Modern Painters

Spring, 2 credits

HUGH T. BROADLEY

This course begins with a study of the art of the outstanding masters of the 17th Century and of the general current of painting in that century, with emphasis on the development of painting through the National Schools and styles up to the present moment. The main concern will be to arrive at an understanding and appreciation of impressionism and post-impressionism.

Applied Arts

8-55. Introduction to Interior Decoration

Fall, non-credit. Repeated in Spring

DOROTHY F. GEARHART

A non-credit course designed for persons who wish a non-professional knowledge of the principles of color and design to help them with their home-decorating problems. Topics discussed include discovering and using design, elements and principles of design, color and color systems.

8-144. Graphic Arts in the Federal Government

Fall, 2 credits

MAURICE EYSENBURG, GARNET W. JEX, and WILLIAM KENNEDY

Introduction to the study of the elements that comprise the broad field of the graphic arts. The course consists of lectures by persons well qualified in

every branch of originating, designing, and executing visual presentations as practiced by government graphics staffs. Demonstrations and assignments serve as themes for round table analysis. Discussion of media and techniques. The course is intended for persons who wish to enter or advance in the field of graphic arts.

8-284. Landscape Design of Small Property

Fall, 2 credits

HENRY SCHULTHEIS

An introduction to the fundamentals of landscape design with particular emphasis upon the design of small properties. Includes principles of orientation, arrangement and circulation.

8-285. Landscape Use of Trees, Shrubs, Vines, and Flowers

Spring, 2 credits

HENRY SCHULTHEIS

A study of the principles and practices relating to site, planting, care and maintenance of ornamental trees and shrubs; care and maintenance of lawns and gardens.

PHOTOGRAPHY

COMMITTEE

ELBRIDGE C. PURDY (Chairman)

JAMES A. BEALES
EDWARD S. COBB
RAYMOND DAVIS
FRED W. GERRETSON
JULIUS HALSMAN
R. J. LEFEBVRE

KEITH B. LEWIS
ALBERT R. MATERAZZI
ALBERT W. MATTHEWS
CHARLES T. MYERS, JR.
HOWLAND PIKE
WILLIAM E. WEIR

8-70. Popular Photography

Fall, non-credit. Repeated in Spring

WILLIAM C. MCHENRY

This is a lecture demonstration course of a non-technical nature. It is intended particularly for those camera enthusiasts who desire a clearer understanding of how their cameras, films and prints work. Better pictures should be the result of taking this course. Topics covered: camera types and operation; film types and uses; developing and printing; filters; exposure; planning, composition and lighting; portraiture; motion pictures; color photography. Exhibition and demonstration of equipment, materials and techniques supplement class lectures and discussion.

8-161. Lithography I—Camera

Fall, 4 credits. Repeated in Spring

ALEXANDER NOVAK

Basic information on the principles of lithography and operational procedures. Functions of equipment and explanation of the purpose or use of materials involved in camera work. Function of process cameras and lenses; purpose and uses of various films and darkroom processes; familiarization with fine-line requirements; function and purpose of color filters; halftone principles—optical screens; halftone principles—contact screens; outline of four-color process; purpose of dot-etching, masking, surprints, lateral reversal, etc. Lecture, demonstration, and practice. *Prerequisite:* One year's experience in a lithographic plant; or Fundamentals of Photography I; or the equivalent, subject to the approval of the instructor.

8-163. Lithography II

Fall, 3 credits. Repeated in Spring

JOSEPH F. HAMM

Continuation of Lithography I, providing advanced and refined study in the field of lithography. Preparation of art and copy; planning and layout; negative engraving and stripping; blueline method for color separation; imposition and register; vinyl plastics in lithography; color proofs on vinyl; chemistry of plate-making; comparison of various plate-making processes; plate-making techniques; formulas and procedures; offset papers and their uses; composition and application of offset inks and compounds; introduction to presswork; finishing procedures and equipment; latest techniques and materials in lithography; lithographic plant management. *Prerequisite:* Lithography I, or experience in a lithographic plant.

8-165. Photocomposing I—Principles

Fall, 3 credits. Repeated in Spring

W. HOWARD MARTIN

This course is designed to acquaint the student with the fundamentals of good composition and layout, and the application of these principles to the paste-up of positives, using type from phototype setting equipment and the Fotosetter. An analysis of good and bad composition is made through the study of advertisements, photographs, and illustrations. Instruction is given in the use of drafting equipment and materials in the preparation of advertisements, ruled forms, and simple and complex booklets, using photographs, illustrations, and color overlays.

8-166. Photocomposing II—Practice

Fall, 3 credits. Repeated in Spring

HENRY DOMBROWSKI

This course furnishes laboratory instruction and practice in the fundamentals of basic photographic processes. Students prepare prints and negatives used in the paste-up class, photograph completed assignments, and opaque and engrave the final negatives. They are instructed in the stripping of halftone and line negatives, masking, surprinting, and register of negatives.

8-192. Fundamentals of Photography I

Fall, 2 credits. Repeated in Spring

EDWARD S. COBB

This lecture course presents the principles of photography to explain the reasons for the various operations. It forms a foundation for all the more advanced courses in photography. The topics covered include: the nature of the photographic process, light as applied to photography, developing chemicals, factors in development, judging exposure, lenses and image formation, effects of lighting the subject, shutter performance, and fixing and washing.

8-193. Practice of Photography I

Fall, 2 credits. Repeated in Spring

HARRY L. BURNETT, JR.

This course furnishes laboratory practice and demonstration of the principles taught in Fundamentals of Photography I. It offers the student an opportunity to become familiar with recommended procedures and techniques. Topics covered: contact printing and processing; selection of printing papers; processing of negative roll film, cut film and film pack; diagnosis and remedy of processing defects; types of cameras, their operation and uses, and the application of filters. *Prerequisite:* Fundamentals of Photography I, or taken concurrently with Fundamentals of Photography I.

8-195. Fundamentals of Photography II

Spring, 2 credits

ALBERT R. MERRITT

The theory of projection printing, characteristics of photographic materials, exposure and exposure devices, types and functions of light filters, photographic lights and lighting, and the theory and application of sensitometry as a means of measuring and controlling the photographic process.

8-196. Practice of Photography II

Spring, 2 credits

HARRY L. BURNETT, JR.

Subjects include: projection printing, application of sensitometric measurements, print correction, composite printing, use of variable contrast papers, lighting, rendition of form and texture, light patterns, the effect of light on color, toning, and print quality analysis. *Prerequisite:* Fundamentals of Photography I, Practice of Photography I, and Fundamentals of Photography II. May be taken concurrently with Fundamentals II.

8-194. Better Pictures through Composition I

Fall, 2 credits

MARTIN H. MILLER

Designed to give practical help to the beginner as well as to the advanced photographer, to the amateur as well as to the professional. Develops understanding and use of the elements that improve pictures: how to see a picture, subject interest, balance, line, tone, mass, design, print quality, cropping, color. Criticism and suggestions to student on his own prints or slides. Practice in analyzing photographs and slides. Students also have opportunity to see and discuss the work of some of America's outstanding pictorial and photo-journalist photographers. Trip to museum or picture-taking outing included.

8-197. Better Pictures through Composition II

Spring, 2 credits

MARTIN H. MILLER

Continuation of 8-194. For new students and for those who wish to go on from the fall semester. Topics covered include: review of basic principles, night photography, prize-winning photography, salon photography, criticism and suggestions to student on his own prints or slides. Practice in analyzing photographs. Picture-taking outings.

8-270. Color Photography I—Monopack Color Printing

Fall, 3 credits

OSCAR RODBELL

Theory and practice of making color prints on Ansco Printon. Lecture and supervised laboratory work covers in detail: principles of the Printon monopack color process, equipment, selection of transparency, contrast control masking, color compensation filters, exposure control methods and processing. *Prerequisite:* Fundamentals of Photography II and Practice of Photography II, or consent of instructor.

8-271. Color Photography II—Color Film Exposure and Processing

Spring, 3 credits

OSCAR RODBELL

Theory and practice of exposure and processing color transparency films. Lecture and supervised laboratory work covers in detail: principles of monopack color films, equipment, color compensation filters, light balancing filters, and exposure of color films under studio and daylight conditions. Instruction covers esthetics of color composition, including arrangement, emphasis, choice of ob-

jects, camera and lighting techniques. Processing of color transparency films. *Prerequisite:* Fundamentals of Photography II and Practice of Photography II, or consent of instructor.

8-272. Color Photography III—Separation Negatives for Color Printing

Fall, 3 credits

OSCAR RODBELL

Theory and practice of masking and making color separation negatives for the Dye Transfer Color Printing system. Lecture and supervised laboratory work covers in detail: principles of color correction masking, principles of making color separation negatives, equipment, selection of transparency, production of highlight and principal masks, exposure and development control methods, production of balanced, corrected color separation negatives from transparencies and by direct separation. *Prerequisite:* Color Photography I and Color Photography II or consent of instructor.

8-273. Color Photography IV—Dye Transfer Color Printing

Spring, 3 credits

OSCAR RODBELL

Theory and practice of making Dye Transfer matrices and transfer technique. Lecture and supervised laboratory work covers in detail: principles of the matrix printing system, equipment, production of balanced sets of matrices, exposure and development control methods, transferring technique. *Prerequisite:* Color Photography III must be completed before registration for this course.

8-360. Portrait Photography

Year, 2 credits each semester

ELBRIDGE C. PURDY

A studio and darkroom course that provides opportunity for practice. The student learns through individual guidance the subtleties of fine portrait work. Lighting, posing, composition, processing and re-touching. *Prerequisite:* Practice of Photography II.

8-011. Photographic Roundtable

Year, non-credit

WILLIAM C. MCHENRY

The Roundtable has been formed to provide opportunity for the continued study of photography. The group meets twice each month during the regular school year. One meeting is devoted to constructive analysis of photographic work presented by members; the other meeting is devoted to presentation of information about new developments and techniques in photography and to other topics of current interest. The Roundtable sponsors an Annual Salon.

Registration is open to persons who have completed any of the courses in photography offered by the Graduate School. Registration is required, and there is a small registration fee.

Courses Offered at the National Institutes of Health

ADVISORY COMMITTEES

Scientific Courses

DANIEL STEINBERG (Chairman)
ROBERT BERLINER
SEYMOUR S. KETY
CHRISTIAN B. ANFINSEN
ALAN H. MEHLER
BERNARD L. HORECKER
ROBERT B. LIVINGSTON

KENNETH S. COLE
JOHN C. LILLY
HEWITT G. FLETCHER
ROGER M. COLE
DEWITT STETTEN, JR.
DAVID SHAKOW
MURRAY C. BROWN

Administrative Courses

GLEN WILBUR (Chairman)
RICHARD HENSCHEL
ZELDA SCHIFFMAN

ROBERT LEARMOUTH
ESTHER DEEL
ROBERT GRANT

MURRAY C. BROWN

General Studies Courses

LEALON E. MARTIN (Chairman)
ERICH MOSETTIG
SCOTT ADAMS

ALBERT DALTON
RALPH D. LILLIE
MURRAY C. BROWN

In the fall semester, 1954, the National Institutes of Health invited the Graduate School to offer a program of courses at the Bethesda Center, which would be designed to meet the particular needs of the employees of that center. All of the classes meet at the National Institutes of Health in Bethesda, and are open to all Government employees and to the general public. Registration can be completed at the National Institutes of Health or at the Graduate School.

BIOLOGY AND MEDICINE

1-250. Introductory and General Bacteriology

Year, 2 credits each semester

NORMAN McCULLOUGH

Introductory and general bacteriology developed historically. Includes specific handling of major groups of bacteria and techniques employed in bacteriology. No prerequisite.

1-275. Fundamentals of Virology

Year, 2 credits each semester

WALLACE P. ROWE and WILLIAM D. MCBRIDE

A course in general virology for professional personnel. The first semester deals with fundamental aspects of animal, bacterial, and plant viruses; the second semester primarily with specific viruses, chiefly those infecting humans.

1-345. Elementary and Biochemical Genetics

Fall, 1 credit

BRUCE N. AMES

The first half of the course deals with genetic phenomena in various microorganisms, and includes such topics as the genetics of *Neurospora* and transforming factors in bacteria. The latter half of the course covers the theory and prac-

tice of use of microbial mutants in investigating biochemical systems, as well as the biochemistry of some genetically controlled diseases in higher animals. *Prerequisite:* General biology and biochemistry.

1-349. General Mycology

Fall, 2 credits

CHARLOTTE C. CAMPBELL

An introduction to the fungi, their classification, and relationship to man. *Prerequisite:* Course in general biology, or consent of instructor.

1-449. Medical Mycology

Spring, 2 credits

CHARLOTTE C. CAMPBELL

A course in fungal diseases of man and animals. Isolation, identification, physiology of the causal organisms, characteristics and treatment of the disease. *Prerequisite:* Course in general mycology, or consent of instructor.

1-422. Human Physiology

Fall, 3 credits

A. V. WOLF

A course in the physiology of health and disease, consisting of lectures, lecture-conferences, and demonstrations. Emphasis is on function in muscle, peripheral nerve, special senses, central and autonomic nervous systems, heart and circulation, respiration, kidney, water and electrolyte balance, temperature regulation, thirst, digestive system, and basal metabolism. *Prerequisite:* One year of undergraduate biology, chemistry, and physics.

1-427. Physiology of Bacteria

Year, 3 credits each semester

ARTHUR K. SAZ

The basic pathways of carbohydrate, protein, fat and amino-acid metabolism. Nutrition of microorganisms. Relationship to higher forms.

Topics covered also include biochemistry of nitrogen fixation, utilization of mutants for elaboration of metabolic pathways, and current status of modes of actions of antibiotics. *Prerequisite:* Organic chemistry or biochemistry or permission of instructor.

1-455. Cellular Physiology

Year, 2 credits each semester

A. M. SHANES

General chemistry and morphology of the cell. Bioelectrical phenomena and their origin. Permeability, diffusion, and active transport. Excitability phenomena and drug action. Contractility. *Prerequisite:* General college physics, chemistry and biology.

1-505. General Pathology

Fall, 2 credits

GEORGE L. FITE

General pathology for non-medical personnel. Basic types of cellular and tissue response to injury. Local and remote effects of inflammation, neoplasia, deficiency and obstructions. *Prerequisite:* Histology or the equivalent.

1-508. Pathology of Infectious Diseases

Spring, 2 credits

GEORGE L. FITE

The basic mechanisms of the infectious diseases, especially from the standpoint of cellular responses, emphasizing the variations resulting from hypersensitizations, immune responses, and chronicity. Emphasis on bacterial, fungus, and virus infections, with limited consideration of parasitic infections. Lantern slides and projected microscope slides are used, but there is no direct microscope work.

1-628. Advanced Bacteriology—Bacterial Metabolism

Year, 2 credits each semester

HERMAN C. ELLINGHAUSEN

Designed to give a general background in bacterial metabolism as an introduction to more detailed biochemical study. Includes general bacterial physiology and comparative biochemistry; the physiological significance of cellular structures; quantitative growth measurements and their physiological significance with a discussion of the various methods used; the influence of physical conditions on growth and metabolism; bacterial nutrition and chemical needs as illustrated by chemoautotrophs, phototrophs, and heterotrophs; the roles of carbon, nitrogen, minerals, and vitamins, and the influences of antimetabolites; homofermentative and heterofermentative reactions; and recent developments in bacterial physiology, including consideration of terminal respiratory systems, biochemical mutants, simultaneous adaptation, and considerations of pathogenicity and chemotherapy. *Prerequisite:* Introductory bacteriology and college chemistry. Biochemistry desirable.

1-714. Bacteriophages

Fall, 2 credits

ROBERT DE MARS

The phages constitute a detailed model system from which techniques and concepts can be drawn for understanding viruses in general. The course will include a description of the phages and their growth cycles. Considerable emphasis will be given to the genetic and biochemical aspects of phages multiplication. The relationships of phages, as latent (lysogenic) virus, with their bacterial hosts will be set out. Technical demonstrations will be given where appropriate. *Prerequisite:* First course in biochemistry and an understanding of elementary genetics. Auditors from other disciplines (many of which have contributed importantly to this field) are invited.

CHEMISTRY**5-100. General Chemistry**

Year, 3 credits each semester (alternate years)

JAMES W. PRATT

This course is intended to provide background in the problems and practices of chemistry for those whose principal interest lies in some other field or who are engaged in chemical work of a sub-professional nature. It includes descriptive chemistry of the commoner elements as well as a consideration, at the appropriate level, of the atomic theory, the periodic table of the elements, valence, the acid-base concepts, oxidation-reduction reactions, reaction rates and equilibria, pH, normality and molarity, and stoichiometry. The use of standard laboratory equipment is demonstrated. Types of mathematical problems related to chemistry are discussed, and the student is required to establish a certain proficiency in this area. *Prerequisite:* High school or its equivalent, including one year of high-school algebra.

5-248. Organic Chemistry

Year, 3 credits each semester

JAMES W. PRATT

A systematic study of the fundamental chemistry of the compounds of carbon. Individual compounds of special interest, classes of compounds, and general theoretical considerations. The first semester is concerned with aliphatic compounds, the commoner functional groups, and various types of isomerism. The second semester is devoted principally to aromatic chemistry. *Prerequisite:* General inorganic chemistry or consent of the instructor.

5-402. The Theoretical Basis of Organic Chemistry

Fall, 2 credits

WILLIAM R. NES

The basic electronic structure of atoms is presented together with its consequences in terms of valence, chemical bonding, directed covalence, stereochemistry, inductive effects, and resonance effects. This is followed by a discussion of kinetic and thermodynamic control of reactions and a survey of reaction mechanisms including a consideration of the various polar reactions (direct displacement, carbonium ion reactions, internal displacement, aromatic substitution) and free radical reactions. *Prerequisite:* Organic chemistry or consent of the instructor.

5-316. Introductory Biochemistry

Year, 2 credits each semester

NIH STAFF

A comprehensive survey of biochemistry at the elementary level. Presenting the structure, function and interrelationship of the major food stuffs, vitamins, minerals, hormones and enzymes. Discussions of modern experimental approaches to metabolism at the cellular level and in the whole organism. *Prerequisite:* Inorganic and organic chemistry and some background in biology.

5-643. Advanced Topics in Biochemistry

Spring, 2 credits

CHRISTIAN B. ANFINSEN and DEWITT STETTEN, JR.

The major aspects of modern biochemical research will be reviewed and integrated in blocks of lectures by experts in each field. The series will include consideration of such topics as protein, fat, carbohydrate chemistry and metabolism, the biochemistry of drugs and hormones, relation of structure to function, and the like. *Prerequisite:* Introductory biochemistry or permission of the instructor.

5-728. Organic Reaction Mechanisms in Biochemistry

Year, 3 credits each semester

LOUIS A. COHEN

An advanced, non-mathematical discussion of topics in reaction mechanisms, selected primarily from areas of interest to biochemists. Its purpose is to provide researchers with an auxiliary tool for the design and interpretation of enzyme experiments. The early lectures will be devoted to a brief survey of basic mechanisms, so that a prior knowledge of mechanisms is not prerequisite.

5-349. Physical Chemistry

Year, 2 credits each semester

RALPH BRODD

Lecture course on the states of matter—gases, liquids, and solids; elementary thermodynamics, solutions, homogeneous and heterogeneous equilibria including the phase rule; ionic equilibria, conductance, electromotive force; chemical kinetics and colloids. *Prerequisite:* General chemistry, qualitative and quantitative analysis, physics, and calculus, or permission of the instructor.

5-413. Biophysical Instrumentation

Fall, 2 credits

ROBERT L. BOWMAN

A survey course designed to present techniques of physical measurement and control. A descriptive rather than analytical approach covers the methods of measurement and control in use in industrial and physical laboratories. Expedient trail methods and improvisations applicable to research problems are emphasized. *Prerequisite:* College physics, or consent of instructor.

5-417. Chromatography

Fall, 2 credits

ERICH HEFTMANN

Discussion of principles and application of adsorption, partition, ion-exchange, and electro-chromatography. *Prerequisite:* College chemistry.

5-434. Radioisotopes and Their Applications in the Medical Sciences

Spring, 2 credits

DANIEL STEINBERG

A brief introduction to atomic physics and a review of the properties of radioactive isotopes and their emissions. Theoretical and practical aspects of radioassay using proportional, geiger, and scintillation counting. A review of the kinds of information obtainable with isotopic techniques and, with the aid of examples from the literature, an analysis of problems in interpretation of isotope experiments. *Prerequisite:* One year of college physics.

5-648. Protein Chemistry

Fall, 3 credits

HARRY A. SAROFF

Preparation and properties of proteins; protein solubility; characterization and analysis; titration data and interpretation; the binding of neutral and charged molecules. Size, shape, and structure determinations; degradation and modification reactions. *Prerequisite:* B.S. in chemistry. A working knowledge of physical chemistry, preferably one graduate course.

5-719. Enzyme Chemistry

Year, 2 credits each semester

ALAN H. MEHLER

Present concepts of the nature of enzymes and the mechanisms of biological catalysis, presented as appropriate examples are met in a systematic survey of enzymes. Current developments, with emphasis on experimental methods. *Prerequisite:* General biochemistry, or organic and physical chemistry.

5-720. Chemical Quantum Mechanics

Year, 2 credits each semester

GARY FELSENFELD

An introduction to quantum mechanics with emphasis on applications in the theory of chemical structure. The hydrogen atom, hydrogen molecule ion, and hydrogen molecule will be treated in detail, as will the methods of perturbation and variation theory. The later lectures will deal with the extension of these techniques to valence bond, molecular orbital and crystal field models, and solution of problems in molecular structure theory. *Prerequisite:* Knowledge of differential and integral calculus.

5-575. Biochemistry of Non-steroid Hormones

Fall, 2 credits

PETER G. CONDLIFFE

A survey of non-steroid hormones. The course covers methods of bioassay, isolation, chemical characterization and interactions with biochemical systems. Particular attention is paid to the hormones of the pituitary, the thyroid and the pancreas. *Prerequisite:* College biochemistry or mammalian physiology or the consent of the instructor.

5-576. Chemistry and Biological Activity of Steroid Hormones

Spring, 1 credit

WILLIAM R. NES

A survey of the steroidal sex hormones and the hormones of the adrenal cortex. The isolation, assay, chemical synthesis, biosynthesis, metabolism, physi-

ology and pharmacology of these compounds will be discussed. Particular emphasis will be placed on the relationship between chemical structure and biological activity.

5-725. Microbial Biochemistry

Fall, 2 credits

EARL R. STADTMAN

A comprehensive treatment of intermediary metabolism as studied in microbial systems. The course begins with some fundamental biochemical concepts and proceeds to detailed consideration of metabolic pathways and mechanisms. *Prerequisite:* Organic chemistry, and preferably general biochemistry.

5-633. Molecular Structure in Biological Systems

Fall, 2 credits

ALEXANDER RICH and DAVID R. DAVIES

This course will be concerned with the use of X-ray diffraction methods in determining the structure of molecules. It will consist of a general survey of X-ray diffraction techniques such as the geometry of X-ray scattering, symmetry properties of the crystalline state, and the application of Fourier methods in the determination of electron densities in molecules. Some molecular structure determinations will be worked through in detail. Applications will be selected from molecules that are of biological importance. In addition to the crystalline state of matter, attention will be devoted to fibers, such as the nucleic acids and the fibrous proteins. *Prerequisite:* One year of college physics, one year of college mathematics, one year of calculus, or consent of the instructors.

5-49. Elementary Glassblowing

Spring, non-credit

THEODORE D. PERRINE

The design of blown scientific glassware and the technique of the simpler glassblowing operations will be discussed from the practical point of view of the immediate laboratory needs of the scientific worker. The major part of the course will be devoted to actual glassblowing by the registrants. While the course is intended primarily for beginners, facilities will be available for more advanced glassblowers to perfect their technique.

MATHEMATICS AND STATISTICS

3-165. Survey of Biomathematics

Year, 2 credits each semester

SEYMOUR GEISSER

A broad survey limited to the mathematics particularly applicable to biological problems with emphasis on the useful rather than the theoretical. Text: Feldman's *Biomathematics*. The course begins with logarithms and trigonometry and proceeds over the year to the elements of differentiation and integration and the elements of differential equations. *Prerequisite:* Elements of algebra and plane geometry.

3-406. Introduction to Experimental Statistics

Year, 2 credits each semester

ROBERT J. TAYLOR

Some of the fundamental bases of statistical analysis, followed by consideration of the tests of significance most generally useful in the analysis of biological experiments. Includes the usual tests of significance, confidence limits, analysis of variance, curve fitting, and bioassay. *Prerequisite:* Bachelor's degree.

FOREIGN LANGUAGES

2-49. Basic Scientific and Medical Russian

Fall, non-credit

ALEXIS SHELOKOV

Introduction to the written Russian language with emphasis on writings in the biological, medical, and related fields. Fundamentals of grammar and syntax combined with readings in simpler texts, progressing to individual assignments in the current Soviet journals in the students' fields of interest. One two-hour meeting a week. No previous knowledge of Russian required.

2-55. Readings in Scientific and Medical Russian

Spring, non-credit

ALEXIS SHELOKOV

Weekly reading assignments from Russian journals of students' choice. During class meetings, the assignments are discussed and elucidated. Special attention is given to vocabulary building and review of grammar essentials. One two-hour meeting a week. *Prerequisite:* Basic scientific and medical Russian, or first-year Russian, or the equivalent.

2-257. Conversational and Scientific French

Year, 2 credits each semester

HELENE SCHRECKER

Conversational practice for the development of oral facility and training in pronunciation and diction. Vocabulary building through reading of modern scientific literature. Basic review of grammar. *Prerequisite:* Two years of college French, or the equivalent.

2-263. Scientific German

Year, 2 credits each semester

ERICH MOSETTIG

Designed to give the student a reading knowledge of German scientific literature in the fields of chemistry, physics, biology, and medicine. *Prerequisite:* One to two years of high school or college German, or equivalent knowledge of German grammar.

PSYCHOLOGY

7-541. Improving Human Relations and Group Behavior

Fall, 2 credits. Repeated in Spring

CARL F. BAUER

This course is designed to provide diagnostic practice training and experience in bettering human relations, group behavior, and in solving group problems of conflict, apathy, and inadequate decision-making. Includes training in the leadership team method in terms of occupational and organizational settings where groups are important instruments of deliberation, action, and learning. Skill practice in relationship therapy, non-directive counseling, free association discussion and its value, problem-inventory, feed-back, evaluation, role-playing, and the group decision method. The course is based upon a theoretical study of four major approaches to the investigation of modern group life.

PUBLIC SPEAKING

2-212. Improving Professional Speaking I

Fall, 2 credits

LEON E. TRACHTMAN

A basic course in public speaking designed to enable the student to improve his speaking in general, with emphasis on the handling of speech situations peculiar to professional occupations. Special attention is given to (1) emotional adjustment, (2) the development of an efficient and pleasing voice, and (3) the development of a sense of immediacy and audience contact. These skills are exercised in the weekly preparation and delivery of short speeches, descriptive, informative, or narrative.

2-213. Improving Professional Speaking II

Spring, 2 credits

LEON E. TRACHTMAN

A continuation of *Improving Professional Speaking I*. Special attention is given to (1) the development of the entire speaking personality as demonstrated through vocal and physical delivery, (2) the development of the ability to select, organize, and develop ideas for presentation, and (3) the development of the ability to read aloud effectively materials from the printed page. These skills are exercised in the weekly preparation and delivery of short speeches, argumentative or persuasive. *Prerequisite*: Improving Professional Speaking I, its equivalent, or permission of the instructor.

ADMINISTRATION

The Graduate School will organize NIH sections of any courses in administration listed in the general Graduate School catalog provided there is sufficient registration. The following courses have been selected by the NIH Advisory Committee for Administration as of greatest interest to NIH people.

6-405. Principles and Techniques of Management Analysis

Two semesters, 2 credits

Deals with the principles and techniques employed in surveying and analyzing organization and methods problems and in formulating solutions to such problems. Emphasis on planning and conducting procedures surveys; methods and approaches in analyzing and planning organization structures including analysis of the impact of individual and group behavior on formal organization structures and authority; methods of dividing work (production planning) and controlling work flow (production control); relationship of the scientific method to O&M work; analysis of staff and line concepts and relationships including the problem of overcoming resistance to new methods and procedures. *Prerequisite*: Experience in O&M work.

6-430. Public Personnel Administration

One semester, 2 credits

ELINOR G. HAYES

Designed for supervisors and administrators wishing to have general familiarity with personnel work, for those in junior personnel staff positions desiring a broad understanding of personnel administration, and for those desiring to enter the field who need a foundation for the more specialized courses in the personnel field. Personnel problems that arise when people are associated together in a work situation; basic personnel policies and practices necessary and useful in treating personnel problems; differences between responsibilities, with respect to personnel administration, of the supervisor and the personnel officer; the various phases of personnel work; study of merit system and forms of organization; civil service legislation at various governmental levels; relationships between the Civil Service Commission and operating agencies and personnel offices of latter; trends in public personnel administration and its relationship to overall management.

4-116. Federal Budgetary Procedure

One semester, 2 credits

This course is designed to assist employees either in budget work or preparatory to taking budget work, up to and including Grade GS-9. It deals with budgetary procedures, including the preparation of estimates, justifications, tabular statements, graphs, etc., and, in connection with budget execution, outlines methods in making allotments, preparation of apportionment and obligation reports, and other methods used in the formulation and execution of the Federal budget.

Correspondence Program

COMMITTEE

E. J. PETERSON (Chairman)

LOUISE O. BERCAW
MARY L. COLLINGS
C. EDWIN DAVIS
WILLIAM A. DeVAUGHAN
E. R. DRAHEIM
CANNON C. HEARNE

HANS S. HOIBERG
JAMES L. ROBINSON
JAMES H. STARKEY
GALEN YATES
GEORGE A. YOUNG

The following courses are open to qualified field employees of the Federal Government and to others as facilities permit. Persons who wish further information or who wish to register in one of the courses should write to the Registrar, U. S. Department of Agriculture Graduate School, Washington 25, D. C.

125C. Basic Lettering

1 credit (7 lessons)

EUGENE MAY

Designed to familiarize the student with the fundamentals of lettering with applications to soil survey charts and maps. Topics covered are basic strokes, spacing, use of the contour pen, and lettering of symbols on aerial photographs. *Cost:* \$12 and \$8 for supplies and postage. (This does not include the lettering tools.)

201C. Administration and Supervision—Basic Principles and Practices

2 credits (16 lessons)

GEORGE A. YOUNG

Designed for persons who direct activities of a group of employees, regardless of number, and for those who desire to become qualified to handle supervisory and administrative responsibilities. Basic management principles. Application of these principles in relation to the most effective managerial practices. Consideration of the most prevalent administrative and supervisory deficiencies, their causes and remedies. Assists the student to prepare to serve effectively as the administrative head of an organizational unit. *Cost:* \$24 and \$8 for supplies and postage. A text is recommended but not required.

236C. Report Writing

2 credits (15 lessons)

JAMES PICKENS

A practical course designed to aid members of the field forces in preparing memoranda and reports to administrative heads. The fundamentals of English composition are briefly and simply treated, and special attention is given to clear, concise, orderly, informative presentation and to avoiding the more common faults of expression. *Cost:* \$24 and \$8 for supplies and postage. The text is extra.

316C. Soils and Soil Management

2 credits (15 lessons)

J. GORDON STEELE

Practical aspects of soil management. Physical, chemical, and biological properties of soils. How soils are formed. Soils of different places. How soils

are changed by erosion, depletion, and improvement. Management of soils for good production and for their conservation and improvement. *Prerequisite:* Chemistry equivalent to that covered in high school. Students who lack a background of at least high-school chemistry should expect to do extra reading. Preparation in physics is helpful but not essential. *Cost:* \$24 and \$8 for supplies and postage. The text is extra.

321C. Farm Forestry

2 credits (15 lessons)

JOHN F. PRESTON

A course in the growing of wood as a farm crop. Principles of forestry as integrated with the farm business, and as contrasted with commercial forestry. The management of woods on the farm; development of a farm woodland enterprise. Designed to assist those who teach agriculture or assist farmers in its practice, professional foresters, and farmers to apply forestry techniques to the special problems of growing wood as a farm crop. Students should have access to a farm woodlot since some of the lessons require actual observation. *Cost:* \$24 and \$8 for supplies and postage. The text is extra.

325C. Legal Aspects of Investigations—Criminal Evidence and Procedure

2 credits (16 lessons)

JAMES D. FORBES

Designed to provide investigative personnel and those desiring to prepare for such work, a background and insight into the legal aspects of their investigations: what types of evidence to seek; circumstances and conditions under which the evidence is to be obtained in order to have adequate probative value; and how to prepare such evidence for presentation in court or other procedure. Since all investigations are potential sources of prosecution, the requirements of criminal evidence and procedure often reach into the early stages of investigation. The instruction is designed to provide understandable information without overemphasis of technical aspects. *Prerequisite:* Experience in some type of investigative work. *Cost:* \$24 and \$10 for supplies and postage.

362C. Federal Meat Inspection and Animal Quarantine Laws

2 credits (16 lessons)

LOWELL E. MILLER

A study of the history, constitutionality, and provisions of the Federal Meat Inspection Act and related legislation, and the Animal Quarantine statutes, with particular reference to the law of search and seizure, affidavits, hearsay and other rules of evidence. The course is intended as an aid to administrative officials. No previous legal training is required. *Cost:* \$24 and \$8 for supplies and postage.

410C. Safety Program Administration

2 credits (15 lessons)

SETH JACKSON

A practical course aimed to help supervisors and staff at all levels with their accident prevention problems. It covers the history and the principles of accident prevention, the basic needs of a safety man, how to appraise training needs and maintain interest in safety efforts. The fundamentals of an effective safety program and some sure-fire formulas successfully used in industry and government are also included. The emphasis is on prevention through human relations rather than on investigation of accidents after they happen. *Cost:* \$24 and \$8 for supplies. The text is extra.

513C. Statistical Methods in Biology and Agriculture

2 credits (15 lessons)

ROBERT J. TAYLOR

This course uses Snedecor's textbook "Statistical Methods," and follows its outline largely but not absolutely. Each of the 15 lessons consists of narrative material, textbook assignments, questions, and problems. The reports are returned with corrections and comments. Subjects discussed include simple variation, regression and correlation, analysis of variance and covariance, chi-square, multiple and curvilinear correlation, applications to sampling and experimental design. Practical application of methods is kept to the front. Facility in the use of arithmetic and simple algebra is necessary. *Cost:* \$24 and \$8 for supplies and postage. The text is extra.

515C. Statistics of Biological Assay

2 credits (15 lessons)

F. M. WADLEY

General principles. Specialized methods that have been developed for planning and analyzing experiments. Graded and all-or-none responses. Estimates of potency. Comparisons of materials. Joint action, variances, and other phases. *Prerequisite:* A course similar to Statistical Methods in Biology and Agriculture. *Cost:* \$24 and \$8 for supplies and postage. The text is extra.

521C. Sampling and Experimental Design

2 credits (16 lessons)

F. M. WADLEY

Students enrolling in this course should have a genuine practical interest in experimentation, and some facility in statistical calculations, including analysis of variance as shown by texts such as Snedecor's or Goulden's. The course is intended to give the student an introduction to basic concepts, some practice in applying them, and some acquaintance with the literature opening the way to further study. The philosophy and fundamentals are first treated, with some attention to elementary sampling principles. Next are presented lessons on simpler practical designs, as to use and analysis of results. Last come lessons on factorial design, confounding and more complex experiments, including incomplete block designs. "Experimental Designs," by Cochran and Cox, is used as a text, with some supplementary discussion. *Cost:* \$24 and \$8 for supplies. The text is extra.

533C. Hydrology I

3 credits (16 lessons)

WALTER T. WILSON

Review of elementary hydraulic principles basic to a study of flow in natural channels. The phenomena of meteorology that control climate. Methods of collecting data essential to hydrology. The physical characteristics of the land that control the disposition and movement of the earth's water. *Prerequisite:* Physics and algebra. Elementary meteorology, statistics, and engineering are desirable, but not required. *Cost:* \$36 and \$8 for supplies and postage. The text is extra.

534C. Hydrology II

3 credits (16 lessons)

WALTER T. WILSON

The tools used by the hydrologist and the application of these tools to specific problems. Hydrograph analysis, runoff relations, runoff distribution, waves, streamflow routing. Special techniques required in the design of projects. Design and operation of water control works. Small basin problems. River forecasting. *Prerequisite:* Hydrology I or an equivalent course. *Cost:* \$36 and \$8 for supplies and postage. The text used in Hydrology I is used also in this course.

580C. Social and Economic History of Agriculture

2 credits (15 lessons)

WAYNE D. RASMUSSEN

Introduction; the geographical basis; indigenous and foreign contributions; agrarian colonization and settlement; land policies; agricultural development by periods, regions, and commodities; farm implements and machinery; labor; tenancy; financing farming operations; transportation and marketing of agricultural products; migration of industries from farm to factory; farmers political movements; agencies promoting agriculture, including individual leadership, societies, fairs, periodicals, State and Federal departments, education, and sciences; agriculture in the life of the Nation. *Cost*: \$24 and \$12 for supplies and postage.

SPECIAL PROGRAM IN METEOROLOGY

The following is a special in-service training course in meteorological analysis and prediction given in cooperation with the U. S. Weather Bureau. The program is under the general direction of Albert V. Carlin, Chief of Training, United States Weather Bureau, Department of Commerce.

535C. Modern Methods of Meteorological Analysis and Prediction

4 credits (8 lessons)

JAY S. WINSTON and ASSOCIATES

An advanced course designed to provide the practicing field meteorologist with a better understanding of some of the techniques and concepts that are of importance in present-day forecasting. Topics are: hemispheric synoptic map analysis, predicting motion and development of waves in the westerlies, numerical weather prediction, large scale-vertical motion and divergence, isentropic analysis, the jet stream, statistical prediction methods, and forecasting tornadoes and severe thunderstorms. Reading assignments covering each of these topics have been selected from a variety of recent articles and books. Each lesson contains an extensive laboratory exercise, which serves to illustrate the particular topic by practical analysis of, or computation from, typical synoptic cases. *Prerequisite*: Basic knowledge of synoptic and dynamic meteorology and weather forecasting.

SPECIAL PROGRAM FOR PERSONNEL OF THE BORROWING COOPERATIVE OF REA

Three additional correspondence courses designed for Borrowers' Personnel of the Rural Electrification Administration are scheduled to be completed by the fall of 1957. These will cover: (1) Basic accounting; (2) REA Borrowers' Accounting (Electric); and (3) REA Borrowers' Accounting (Telephone).

Faculty

FACULTY, DEPARTMENTAL AND SPECIAL COMMITTEES

The year following the name represents the first year of association with the Graduate School.

- ACKER, LAURENCE W., (1948). Tyler Commercial College. Deputy Chief, Army Audit Agency, Department of the Army. Taught at Columbus School of Accounting. (Public Administration)
- ACKERMAN, CLARA B., (1950). M.A., George Washington. Formerly Editor, Extension Service Review, Federal Extension Service, USDA. (Committee on Information)
- ADAMS, SCOTT, (1954). B.A., Yale; B.L.S., Columbia. Librarian, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
- ADELSON, SADYE F., (1949). M.A., California. Nutrition Analyst, Institute of Home Economics, Agricultural Research Service, USDA. (Technology)
- AITON, EDWARD W., (1953). Ed.D., Maryland. Director, Four-H Club and YMW Programs, Federal Extension Service, USDA. (Social Sciences)
- ALLIN, BUSHROD W., (1939). Ph.D., Wisconsin. Chairman, Outlook and Situation Board, Agricultural Marketing Service, USDA. Taught at Wisconsin. (Social Sciences)
- AMES, BRUCE N., (1955). Ph.D., California Institute of Technology. Scientist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
- ANFINSEN, CHRISTIAN B., (1954). Ph.D., Harvard. Chief, Laboratory of Cellular Physiology and Metabolism, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Harvard. (NIH)
- APPLEMAN, PAUL L., (1946). Occupational Specialist, Bureau of Programs and Standards, Civil Service Commission. (Public Administration)
- ARMSTRONG, DOROTHY P., (1955). Supervisory Project Planner, Bureau of the Census, Department of Commerce. (Mathematics and Statistics)
- ARNOLD, OLGA MOORE, (1954). B.A., Wyoming. Information Specialist, U. S. Information Agency. (Languages and Literature)
- ASKEGAARD, DAVID, (1950). B.S., North Dakota. Head, Operations Section 8, Southwest Area, Rural Electrification Administration, USDA. (Technology)
- AYLESWORTH, PHILIP F., (1949). M.S., Purdue. Assistant to the Administrator, Federal Extension Service, USDA. (Social Sciences)
- BACHMAN, KENNETH L., (1950). Ph.D., Harvard. Head, Farm Economics Research Division, Agricultural Research Service, USDA. (Social Sciences)
- BAHN, CATHERINE I., (1953). M.A., Columbia. Head, Map Acquisitions Section, Map Division, Library of Congress. (Physical Sciences)
- BAKER, BYRON B., (1957). B.S., Washington. Head, Biological Oceanography Unit, Hydrographic Office, Department of the Navy. Taught at Washington. (Physical Sciences)
- BAKER, GLADYS L., (1945). Ph.D., Chicago. Agricultural Historian, Agricultural Marketing Service, USDA. (Public Administration)
- BALDAUF, TONY M., (1951). Chief, Procurement and Property Management Division, Office of Plant and Operations, USDA. (Office Techniques; Public Administration)
- BAMFORD, RONALD, (1949). Ph.D., Columbia. Dean of Graduate School, University of Maryland. (Biological Sciences)
- BARGIN, GERMAINE, (1954). Diplomee, Universite de Paris and de l'Institut d'Amerique Latine de Mexico. Part-Time Lecturer in French, Catholic University. (Languages and Literature)
- BARNES, CARL B., (1955). Chief, Classification and Organization Branch, Personnel Management Division, Commodity Stabilization Service, USDA. (Committee on Internship Cooperation)
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- HORD, WARNER H., (1945). M.B.A., Harvard. Chief, Office of Carrier Accounts and Statistics, Civil Aeronautics Board. Taught at Tulane. (Public Administration)
- HORECKER, BERNARD L., (1954). Ph.D., Chicago. Biochemist, Chief, Laboratory of Biochemistry and Metabolism, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at George Washington. (NIH)
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- HOUSEMAN, EARL E., (1951). M.S., South Dakota. Mathematical Statistician, Agricultural Marketing Service, USDA. Taught at Iowa State. (Mathematics and Statistics)
- HUBBARD, HENRY F., (1955). Ph.D., George Washington. Personnel Officer, Department of General Administration, District of Columbia Government. Taught at George Washington. (Public Administration)
- HUBERT, LESTER F., (1955). M.S., Chicago. Meteorologist, Weather Bureau, Department of Commerce. (Physical Sciences)
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- IRVING, GEORGE W., JR., (1946). Ph.D., George Washington. Deputy Administrator, Agricultural Research, USDA. Taught at Cornell Medical School and George Washington. (Committee on Internship Cooperation)
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- JEBENS, ARTHUR B., (1953). J.D., Iowa. Director of Management Research, Office of the Secretary, Department of Interior. (Public Administration)
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- JESSEL, J. J. A., (1942). D.Sc., Harvard. Head of Transmission and Coordination Section, Bureau of Power, Federal Power Commission. Taught at Harvard. (Technology)
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- JOHNSON, GERALD H., (1955). B.S., Bowling Green. Commodities Specialist, U. S. Tariff Commission. (Technology)
- JOHNSON, SHERMAN E., (1937). Ph.D., Harvard. Chief Economist, Agricultural Research Service, USDA. Taught at Minnesota, Montana State, and South Dakota State. (Social Sciences)
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- JOSEPHSON, HORACE R., (1949). Ph.D., California. Chief, Division of Forest Economics Research, Forest Service, USDA. Taught at California. (Social Sciences)
- KAUFHOLZ, FERDINAND, (1949). B.C.E., Johns Hopkins. Regional Director, Public Buildings Service, General Services Administration. (Technology)
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- KEILES, ELSA O., (1945). D.Sc., Johns Hopkins. Scientific Grants Administrator, National Heart Institute, National Institutes of Health, Department of Health, Education and Welfare. (Physical Sciences)

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- KOEBEL, RALPH F., (1943). S.J.D., Georgetown. Staff Legal Officer, Office of the General Counsel, USDA. (Public Administration)
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- LAMPHERE, WILLARD H., (1952). B.S., Idaho. Chief, Production Programs Branch, Information Division, Commodity Stabilization Service, USDA. (Committee on Information)
- LANDO, ROBERT H., (1947). M.A., California. Records Management Officer, Agricultural Marketing Service, USDA. (Office Techniques)
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- MERRITT, ALBERT R., (1957). Technologist (Photographic Equipment), Photographic Center, Department of the Navy. (Technology)
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- MILLER, LOWELL E., (1951). J.D., State University of Iowa. Attorney, Office of General Counsel, USDA. (Correspondence)
- MILLER, MARTIN H., (1955). M.A., Western Reserve. National Sales Representative, Savings Bonds Division, Department of the Treasury. Grand Prize Winner, 1954, National Newspaper Snapshot Contest. Winner, John R. Hogan trophy, Photographic Society of America, 1955. Top award for patriotic photograph, Freedom Foundation, 1956. (Technology)
- MINOR, WILLIAM A., (1946). B.S.A., Georgia. Assistant Administrator for Management, Foreign Agricultural Service, USDA. (Public Administration)
- MITCHELL, BETTY S., (1956). Project Planner, UNIVAC, Bureau of the Census, Department of Commerce. (Mathematics and Statistics)
- MOHAGEN, VERNA C., (1942). M.A., George Washington. Director, Personnel Management Division, Soil Conservation Service, USDA. (Correspondence)
- MOHRHARDT, FOSTER E., (1955). M.A., Michigan. Director, Library, USDA. (Languages and Literature)
- MOORE, WILLIAM L., (1948). B.A., Antioch. Chief, Personnel Division, Farm Credit Administration. (Office Techniques)
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- MOUSER, C. M., (1953). M.A., Louisiana State. Chief Clerk, Senate Committee on Agriculture and Forestry. Taught at Sam Houston State and Northwestern State. (Office Techniques)
- MOYER, EUGENE C., (1946). B.S., C.P.A., Georgetown. Practicing Certified Public Accountant; Adjunct Professor, American. (Public Administration)
- MURPHY, CHARLES D., (1947). Ph.D., Cornell. Professor of English, University of Maryland. (Languages and Literature)
- MURR, CARL, (1955). Vocational Rehabilitation Officer, Medical Division, U. S. Civil Service Commission. (Languages and Literature)
- MYERS, CHARLES T., JR., (1955). Chief, Division of Photography, Office of Information, USDA. (Technology)
- NERBOSO, SALVATORE, (1955). Ph.D., Harvard. Librarian, *The New York Times* Washington Bureau. (Public Administration)
- NES, WILLIAM R., (1956). Ph.D., Virginia. Chemist-Biochemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Virginia. (NIH)
- NEWELL, STERLING R., (1929). M.A., American. Director, Agricultural Estimates Division, Agricultural Marketing Service, and Chairman, Crop Reporting Board, USDA. (Mathematics and Statistics)
- NICHOLS, A. J., (1956). D.P.A., Harvard. Assistant Director, Foreign Training Division, Foreign Agricultural Service, USDA. (Public Administration)
- NIKIFOROFF, CONSTANTIN C., (1948). Ph.D., St. Petersburg. Soil Scientist, Soil Conservation Service, USDA (retired). Taught at Maryland and Minnesota. (Physical Sciences)
- NISSELSON, HAROLD, (1946). B.S., College of the City of New York. Statistical Research Division, Bureau of the Census, Department of Commerce. Taught at American. (Mathematics and Statistics)
- NOLAN, EDWIN T., (1949). B.C.S., Columbus. Deputy Director of Accounting, Accounting and Financial Policy Division, Office of the Comptroller of the Army. (Public Administration)
- NORDENSON, TOR, (1956). B.S., Michigan. Chief, Hydrologic Investigations Section, Hydrologic Services Division, U. S. Weather Bureau, Department of Commerce. (Physical Sciences)
- NORTH, ELIZABETH T., (1956). B.S., Temple. Project Planner, UNIVAC, Bureau of the Census, Department of Commerce. (Mathematics and Statistics)
- NOVAK, ALEXANDER, (1956). Offset Photographer, Government Printing Office. (Technology)
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- O'BRIEN, JAMES C., (1955). LL.B., Columbus. Director of Personnel, Department of Health, Education, and Welfare. (Public Administration)
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- OSBORNE, JAMES G., (1953). B.S., California. Statistical Analyst, Forest Service, USDA. (Mathematics and Statistics)
- O'SULLIVAN, PATRICK, (1957). B.A., Cornell. Chief, Language Division, Office of Training, National Security Agency. (Languages and Literature)
- PALLANSCH, MICHAEL J., (1955). Ph.D., Minnesota. Chemist, Eastern Utilization Research Branch, Agricultural Research Service, USDA. Taught at St. John's. (Physical Sciences)
- PALMER, PIERRE S., (1953). B.A., Chicago. Senior Budget Examiner, Bureau of the Budget. (Public Administration)
- PARKIN, ERNEST J., (1950). B.S., George Washington. Mathematician, U. S. Coast and Geodetic Survey, Department of Commerce. Taught at Ohio State. (Technology)
- PATCHETT, ARTHUR A., (1955). Ph.D., Harvard. Assistant Scientist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. (NIH)
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- PELTIER, LOUIS C., (1953). Ph.D., Harvard. Program Officer, Special Projects Staff, Office of Area Development, Department of Commerce. Taught at Bucknell, Harvard, and Washington. (Physical Sciences)
- PERLMUTTER, JEROME H., (1955). M.A., American. Chief, Editorial Section, Division of Publications, Office of Information, USDA. Taught at American. (Languages and Literature; Committee on Publications)
- PERRINE, THEODORE D., (1956). M.E., Stevens Institute of Technology. Research Chemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Montana State College. (NIH)
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- POLLOCK, ROSS, (1946). M.A., George Washington. Chief, Career Development Program, Civil Service Commission. (Public Administration)
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- POPECKI, JOSEPH T., (1952). B.S.L.S., Catholic. Assistant to the Director of Libraries, Catholic University. Taught at Catholic. (Languages and Literature)
- POTTER, WILLIAM D., (1952). M.S., Cornell. Hydraulic Engineer, Hydraulic Research Division, Bureau of Public Roads, Department of Commerce. (Technology)
- PRATT, JAMES W., (1954). Ph.D., Georgetown. Chemist, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Department of Health, Education, and Welfare. Taught at Boston College, Georgetown, and Montgomery Junior College. (Physical Sciences)
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- PRITZKER, DOROTHY P., (1956). B.A., Kentucky. Training Officer, Bureau of the Census, Department of Commerce. (Languages and Literature)
- PURDY, ELBRIDGE C., (1943). Master of Photography. Division of Photography, Office of Information, USDA. (Technology)
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